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Service Manual

Contents **Page**

1. Revision List 2
2. Technical Specs, Diversity, and Connections 2
3. Precautions, Notes, and Abbreviation List 5
4. Mechanical Instructions 9
5. Service Modes, Error Codes, and Fault Finding 17
6. Alignments 27
7. Circuit Descriptions 29
8. IC Data Sheets 34
9. Block Diagrams
   - Wiring diagram 19" S35 series 43
   - Wiring diagram 22" 3007 series 44
   - Wiring diagram 22" 3017 series 45
   - Block Diagram 46
10. Circuit Diagrams and PWB Layouts *Drawing* *PWB*
    - A 715G5309 PSU 47 49-50
    - B 715G5430 SSB S35 series 51 67-68
    - J 715G5230 IR/LED 3000 series 69 70
    - J 715G5596 IR/LED panel 71 72
    - E 715G5252 Keyboard control panel 3500/4000 series 73 74
    - E 715G5709 Keyboard control panel 22" series 75 76
    - HC 715G5482 Hotel panel 77 79-80
11. Styling Sheets
    - S35 series 19" 81
    - 3007 series 22" 82
    - 3017 series 22" 83

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PHILIPS

1. Revision List

Manual xxxx xxx xxxx.0

- First release.

2. Technical Specs, Diversity, and Connections

Index of this chapter:

2.1 Technical Specifications
2.2 Directions for Use
2.3 Connections
2.4 Chassis Overview

Notes:

- Figures can deviate due to the different set executions.
- Specifications are indicative (subject to change).

2.1 Technical Specifications

For on-line product support please use the links in Table 2-1. Here is product information available, as well as getting started, user manuals, frequently asked questions and software & drivers.

Table 2-1 Described Model Numbers and Diversity

	2	4			9		10				11
		Mechanics			Block Diagrams		Schematics				
CTN	Connection Overview	Wire Dressing	Rear Cover Removal	SSB Removal	Wiring Diagram	Block Diagram	Power Supply	SSB	J (IR/LED)	E (Keyboard/Leading Edge)	Styling
19HFL3007D/10	2-1	4-1	4-5	4-6	9.1	9.4	10.1	10.2	10.3	10.5	11.1
22HFL3007D/10	2-1	4-2	4-5	4-6	9.2	9.4	10.1	10.2	10.4	10.6	11.2
22HFL3017D/10	2-1	4-3	4-7	4-8	9.3	9.4	10.1	10.2	10.3	10.5	11.3
22HFL3017W/10	2-1	4-3	4-7	4-8	9.3	9.4	10.1	10.2	10.3	10.5	11.3

2.2 Directions for Use

Directions for use can be downloaded from the following websites:
http://www.philips.com/support
http://www.p4c.philips.com

2.3 Connections

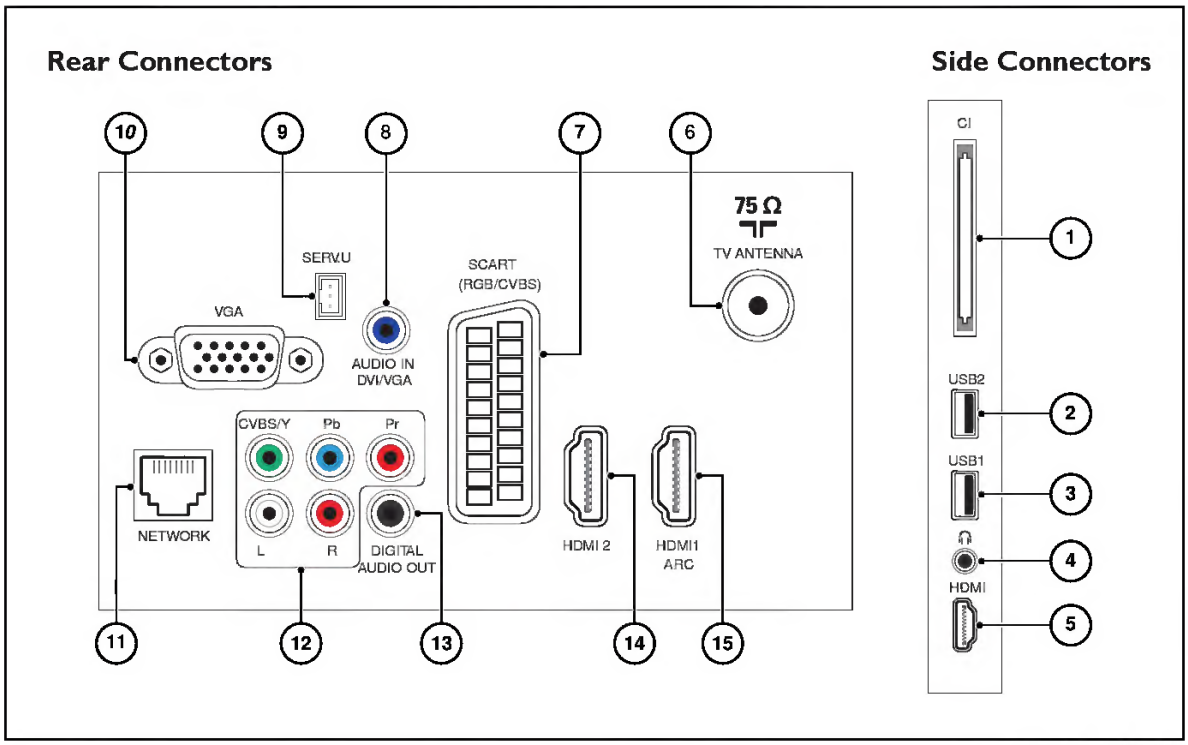


Figure 2-1 Connection overview

Note: The following connector colour abbreviations are used (acc. to DIN/IEC 757): Bk= Black, Bu= Blue, Gn= Green, Gy= Grey, Rd= Red, Wh= White, Ye= Yellow.

2.3.1 Side Connections

1 - Common Interface
68p - See figure 10-2-14

2 - USB2 2.0

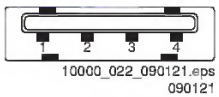


Figure 2-2 USB (type A)

1	- +5V		
2	- Data (-)		
3	- Data (+)		
4	- Ground	Gnd	

3 - USB1 2.0 (optional)
See 2 - USB2 2.0

4 - Head phone (Output)
Bk - Head phone 80 - 600 Ω / 10 mW

5 - HDMI: Digital Video - In, Digital Audio - In/Out

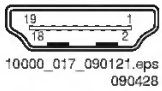


Figure 2-3 HDMI (type A) connector

1	- D2+	Data channel	
2	- Shield	Gnd	
3	- D2-	Data channel	
4	- D1+	Data channel	
5	- Shield	Gnd	
6	- D1-	Data channel	
7	- D0+	Data channel	
8	- Shield	Gnd	
9	- D0-	Data channel	
10	- CLK+	Data channel	
11	- Shield	Gnd	
12	- CLK-	Data channel	
13	- Easylink/CEC	Control channel	
14	- n.c.		
15	- DDC_SCL	DDC clock	
16	- DDC_SDA	DDC data	
17	- Ground	Gnd	
18	- +5V		
19	- HPD	Hot Plug Detect	
20	- Ground	Gnd	

2.3.2 Rear Connections

6 - TV ANTENNA - In
Signal input from an antenna, cable or satellite.

7 - SCART: Video RGB/YC - In, CVBS - In/Out, Audio - In/Out

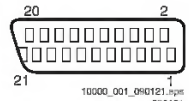


Figure 2-4 SCART connector

1	- Audio R	0.5 V_{RMS} / 1 kΩ	
2	- Audio R	0.5 V_{RMS} / 10 kΩ	
3	- Audio L	0.5 V_{RMS} / 1 kΩ	
4	- Ground Audio	Gnd	
5	- Ground Blue	Gnd	
6	- Audio L	0.5 V_{RMS} / 10 kΩ	
7	- Video Blue/C-out	0.7 V_{PP} / 75 Ω	
8	- Function Select	0 - 2 V: INT 4.5 - 7 V: EXT 16:9 9.5 - 12 V: EXT 4:3	
9	- Ground Green	Gnd	
10	- n.c.		
11	- Video Green	0.7 V_{PP} / 75 Ω	
12	- n.c.		
13	- Ground Red	Gnd	
14	- Ground P50	Gnd	
15	- Video Red/C	0.7 V_{PP} / 75 Ω	
16	- Status/FBL	0 - 0.4 V: INT 1 - 3 V: EXT / 75 Ω	
17	- Ground Video	Gnd	
18	- Ground FBL	Gnd	
19	- Video CVBS	1 V_{PP} / 75 Ω	
20	- Video CVBS/Y	1 V_{PP} / 75 Ω	
21	- Shield	Gnd	

8 - Audio - In: Left / Right, VGA

Bu	- Audio L/R in	0.5 V_{RMS} / 10 kΩ	

9 - Service / UART

1	- Ground	Gnd	
2	- UART_TX	Transmit	
3	- UART_RX	Receive	

10 - PC IN:VGA

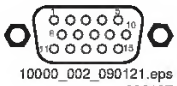


Figure 2-5 VGA connector

1	- Video Red	0.7 V_{PP} / 75 W	
2	- Video Green	0.7 V_{PP} / 75 W	
3	- Video Blue	0.7 V_{PP} / 75 W	
4	- n.c.		
5	- Ground	Gnd	
6	- Ground Red	Gnd	
7	- Ground Green	Gnd	
8	- Ground Blue	Gnd	
9	- +5V_{DC}	+5 V	
10	- Ground Sync	Gnd	
11	- Ground Red	Gnd	
12	- DDC_SDA	DDC data	
13	- H-sync	0 - 5 V	
14	- V-sync	0 - 5 V	
15	- DDC_SCL	DDC clock	

11 - RJ45: Ethernet

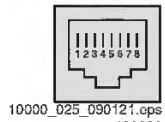


Figure 2-6 Ethernet connector

1	- TD+	Transmit signal	
2	- TD-	Transmit signal	
3	- RD+	Receive signal	
4	- CT	Centre Tap: DC level fixation	
5	- CT	Centre Tap: DC level fixation	
6	- RD-	Receive signal	
7	- GND	Gnd	
8	- GND	Gnd	

12 - EXT2: Video YPbPr - In, Audio - In

Gn	- Video - Y	1 V_{PP} / 75 W	
Bu	- Video - Pb	0.7 V_{PP} / 75 W	
Rd	- Video - Pr	0.7 V_{PP} / 75 W	
Wh	- Audio - L	0.5 V_{RMS} / 10 kΩ	
Rd	- Audio - R	0.5 V_{RMS} / 10 kΩ	

13 - Cinch: Digital Audio - Out

BK	- Coaxial	0.4 - 0.6V_{PP} / 75 Ω	

14 - HDMI 2: Digital Video - In, Digital Audio - In/Out

See 5 - HDMI: Digital Video - In, Digital Audio - In/Out

15 - HDMI 1: Digital Video - In, Digital Audio with ARC - In/Out

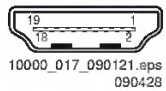


Figure 2-7 HDMI (type A) connector

1	- D2+	Data channel	
2	- Shield	Gnd	
3	- D2-	Data channel	
4	- D1+	Data channel	
5	- Shield	Gnd	
6	- D1-	Data channel	
7	- D0+	Data channel	
8	- Shield	Gnd	
9	- D0-	Data channel	
10	- CLK+	Data channel	
11	- Shield	Gnd	
12	- CLK-	Data channel	
13	- Easylink/CEC	Control channel	
14	- ARC	Audio Return Channel	
15	- DDC_SCL	DDC clock	
16	- DDC_SDA	DDC data	
17	- Ground	Gnd	
18	- +5V		
19	- HPD	Hot Plug Detect	
20	- Ground	Gnd	

16 - TV ANTENNA - In

Signal input from an antenna, cable or satellite.

2.4 Chassis Overview

Refer to 9. Block Diagrams for PWB/CBA locations.

3. Precautions, Notes, and Abbreviation List

Index of this chapter:

3.1 Safety Instructions
3.2 Warnings
3.3 Notes
3.4 Abbreviation List

3.1 Safety Instructions

Safety regulations require the following **during** a repair:

- Connect the set to the Mains/AC Power via an isolation transtormer (> 800 VA).
- Replace safety components, indicated by the symbol ⚠, only by components identical to the original ones. Any other component substitution (other than original type) may increase risk ot tire or electrical shock hazard.

Safety regulations require that **after** a repair, the set must be returned in its original condition. Pay in particular attention to the following points:

- Route the wire trees correctly and tix them with the mounted cable clamps.
- Check the insulation ot the Mains/AC Power lead for external damage.
- Check the strain relief of the Mains/AC Power cord for proper tunction.
- Check the electrical DC resistance between the Mains/AC Power plug and the secondary side (only tor sets that have a Mains/AC Power isolated power supply):
  1. Unplug the Mains/AC Power cord and connect a wire between the two pins of the Mains/AC Power plug.
  2. Set the Mains/AC Power switch to the "on" position (keep the Mains/AC Power cord unplugged!).
  3. Measure the resistance value between the pins of the Mains/AC Power plug and the metal shielding of the tuner or the aerial connection on the set. The reading should be between 4.5 MΩ and 12 MΩ.
  4. Switch "off" the set, and remove the wire between the two pins ot the Mains/AC Power plug.
- Check the cabinet for defects, to prevent touching of any inner parts by the customer.

3.2 Warnings

- All ICs and many other semiconductors are susceptible to electrostatic discharges (ESD ⚠). Careless handling during repair can reduce life drastically. Make sure that, during repair, you are connected with the same potential as the mass of the set by a wristband with resistance. Keep components and tools also at this same potential.
- Be careful during measurements in the high voltage section.
- Never replace modules or other components while the unit is switched "on".
- When you align the set, use plastic rather than metal tools. This will prevent any short circuits and the danger ot a circuit becoming unstable.

3.3 Notes

3.3.1 General

- Measure the voltages and waveforms with regard to the chassis (= tuner) ground (⏚), or hot ground (⏚), depending on the tested area ot circuitry. The voltages and waveforms shown in the diagrams are indicative. Measure them in the Service Default Mode with a colour bar signal and stereo sound (L: 3 kHz, R: 1 kHz unless stated otherwise) and picture carrier at 475.25 MHz for PAL, or 61.25 MHz for NTSC (channel 3).
- Where necessary, measure the wavetorms and voltages with (⊓⊓) and without (⊼) aerial signal. Measure the voltages in the power supply section both in normal operation (◑) and in stand-by (⏻). These values are indicated by means ot the appropriate symbols.

3.3.2 Schematic Notes

- All resistor values are in ohms, and the value multiplier is often used to indicate the decimal point location (e.g. 2K2 indicates 2.2 kΩ).
- Resistor values with no multiplier may be indicated with either an "E" or an "R" (e.g. 220E or 220R indicates 220 Ω).
- All capacitor values are given in micro-farads ($\mu = \times 10^{-6}$), nano-farads ($n = \times 10^{-9}$), or pico-tarads ($p = \times 10^{-12}$).
- Capacitor values may also use the value multiplier as the decimal point indication (e.g. 2p2 indicates 2.2 pF).
- An "asterisk" (*) indicates component usage varies. Refer to the diversity tables tor the correct values.
- The correct component values are listed on the Philips Spare Parts Web Portal.

3.3.3 Spare Parts

For the latest spare part overview, consult your Philips Spare Part web portal.

3.3.4 BGA (Ball Grid Array) ICs

Introduction

For more information on how to handle BGA devices, visit this URL: http://www.atyourservice-magazine.com. Select "Magazine", then go to "Repair downloads". Here you will find information on how to deal with BGA-ICs.

BGA Temperature Profiles

For BGA-ICs, you **must** use the correct temperature-protile. Where applicable and available, this protile is added to the IC Data Sheet information section in this manual.

3.3.5 Lead-free Soldering

Due to lead-tree technology some rules have to be respected by the workshop during a repair:

- Use only lead-free soldering tin. If lead-free solder paste is required, please contact the manutacturer of your soldering equipment. In general, use ot solder paste within workshops should be avoided because paste is not easy to store and to handle.
- Use only adequate solder tools applicable for lead-tree soldering tin. The solder tool must be able:
  - To reach a solder-tip temperature ot at least 400 °C.
  - To stabilize the adjusted temperature at the solder-tip.
  - To exchange solder-tips tor different applications.
- Adjust your solder tool so that a temperature ot around 360 °C - 380 °C is reached and stabilized at the solder joint. Heating time ot the solder-joint should not exceed ~ 4 sec. Avoid temperatures above 400 °C, otherwise wear-out of tips will increase drastically and tlux-tluid will be destroyed. To avoid wear-out ot tips, switch "otf" unused equipment or reduce heat.
- Mix of lead-free soldering tin/parts with leaded soldering tin/parts is possible but PHILIPS recommends strongly **to avoid** mixed regimes. If this cannot be avoided, carefully clear the solder-joint from old tin and re-solder with new tin.

3.3.6 Alternative BOM identification

it should be noted that on the European Service website, "Alternative BOM" is referred to as "Design variant".

The **third digit** in the serial number (example: AG2B0335000001) indicates the number ot the alternative B.O.M. (Bill Ot Materials) that has been used tor producing the specitic TV set. In general, it is possible that the same TV model on the market is produced with e.g. two different types of displays, coming trom two different suppliers. This will then

result in sets which have the same CTN (Commercial Type Number; e.g. 28PW9515/12) but which have a different B.O.M. number.
By looking at the third digit of the serial number, one can identify which B.O.M. is used tor the TV set he is working with. If the third digit of the serial number contains the number "1" (example: AG1B033500001), then the TV set has been manutactured according to B.O.M. number 1. It the third digit is a "2" (example: AG2B0335000001), then the set has been produced according to B.O.M. no. 2. This is important tor ordering the correct spare parts!
For the third digit, the numbers 1...9 and the characters A...Z can be used, so in total: 9 plus 26= 35 ditterent B.O.M.s can be indicated by the third digit of the serial number.

Identification: The bottom line ot a type plate gives a 14-digit serial number. Digits 1 and 2 refer to the production centre (e.g. SN is Lysomice, RJ is Kobierzyce), digit 3 refers to the B.O.M. code, digit 4 refers to the Service version change code, digits 5 and 6 refer to the production year, and digits 7 and 8 refer to production week (in example below it is 2010 week 10 / 2010 week 17). The 6 last digits contain the serial number.

Figure 3-1 Serial number (example)

3.3.7 Board Level Repair (BLR) or Component Level Repair (CLR)

If a board is defective, consult your repair procedure to decide it the board has to be exchanged or if it should be repaired on component level.
If your repair procedure says the board should be exchanged completely, do not solder on the detective board. Otherwise, it cannot be returned to the O.E.M. supplier tor back charging!

3.3.8 Practical Service Precautions

- **It makes sense to avoid exposure to electrical shock.** While some sources are expected to have a possible dangerous impact, others of quite high potential are of limited current and are sometimes held in less regard.
- **Always respect voltages.** While some may not be dangerous in themselves, they can cause unexpected reactions that are best avoided. Before reaching into a powered TV set, it is best to test the high voltage insulation. It is easy to do, and is a good service precaution.

3.4 Abbreviation List

0/6/12	SCART switch control signal on A/V board. 0 = loop through (AUX to TV), 6 = play 16 : 9 format, 12 = play 4 : 3 format
AARA	Automatic Aspect Ratio Adaptation: algorithm that adapts aspect ratio to remove horizontal black bars; keeps the original aspect ratio
ACI	Automatic Channel Installation: algorithm that installs TV channels directly from a cable network by means of a predetined TXT page
ADC	Analogue to Digital Converter
AFC	Automatic Frequency Control: control signal used to tune to the correct trequency
AGC	Automatic Gain Control: algorithm that controls the video input ot the feature box
AM	Amplitude Modulation
AP	Asia Pacitic
AR	Aspect Ratio: 4 by 3 or 16 by 9
ASF	Auto Screen Fit: algorithm that adapts aspect ratio to remove horizontal black bars without discarding video information
ATSC	Advanced Television Systems Committee, the digital TV standard in the USA
ATV	See Auto TV
Auto TV	A hardware and software control system that measures picture content, and adapts image parameters in a dynamic way
AV	External Audio Video
AVC	Audio Video Controller
AVIP	Audio Video Input Processor
B/G	Monochrome TV system. Sound carrier distance is 5.5 MHz
BDS	Business Display Solutions (iTV)
BLR	Board-Level Repair
BTSC	Broadcast Television Standard Committee. Multiplex FM stereo sound system, originating from the USA and used e.g. in LATAM and AP-NTSC countries
B-TXT	Blue TeleteXT
C	Centre channel (audio)
CEC	Consumer Electronics Control bus: remote control bus on HDMI connections
CL	Constant Level: audio output to connect with an external amplitier
CLR	Component Level Repair
ComPair	Computer aided rePair
CP	Connected Planet / Copy Protection
CSM	Customer Service Mode
CTI	Color Transient Improvement: manipulates steepness of chroma transients
CVBS	Composite Video Blanking and Synchronization
DAC	Digital to Analogue Converter
DBE	Dynamic Bass Enhancement: extra low frequency amplification
DCM	Data Communication Module. Also reterred to as System Card or Smartcard (for iTV).
DDC	See "E-DDC"
D/K	Monochrome TV system. Sound carrier distance is 6.5 MHz
DFI	Dynamic Frame Insertion
DFU	Directions For Use: owner's manual
DMR	Digital Media Reader: card reader
DMSD	Digital Multi Standard Decoding
DNM	Digital Natural Motion

DNR	Digital Noise Reduction: noise reduction feature of the set
DRAM	Dynamic RAM
DRM	Digital Rights Management
DSP	Digital Signal Processing
DST	Dealer Service Tool: special remote control designed for service technicians
DTCP	Digital Transmission Content Protection; A protocol for protecting digital audio/video content that is traversing a high speed serial bus, such as IEEE-1394
DVB-C	Digital Video Broadcast - Cable
DVB-T	Digital Video Broadcast - Terrestrial
DVD	Digital Versatile Disc
DVI(-d)	Digital Visual Interface (d= digital only)
E-DDC	Enhanced Display Data Channel (VESA standard for communication channel and display). Using E-DDC, the video source can read the EDID information form the display.
EDID	Extended Display Identification Data (VESA standard)
EEPROM	Electrically Erasable and Programmable Read Only Memory
EMI	Electro Magnetic Interference
EPG	Electronic Program Guide
EPLD	Erasable Programmable Logic Device
EU	Europe
EXT	EXTernal (source), entering the set by SCART or by cinches (jacks)
FDS	Full Dual Screen (same as FDW)
FDW	Full Dual Window (same as FDS)
FLASH	FLASH memory
FM	Field Memory or Frequency Modulation
FPGA	Field-Programmable Gate Array
FTV	Flat TeleVision
Gb/s	Giga bits per second
G-TXT	Green TeleteXT
H	H_sync to the module
HD	High Definition
HDD	Hard Disk Drive
HDCP	High-bandwidth Digital Content Protection: A "key" encoded into the HDMI/DVI signal that prevents video data piracy. If a source is HDCP coded and connected via HDMI/DVI without the proper HDCP decoding, the picture is put into a "snow vision" mode or changed to a low resolution. For normal content distribution the source and the display device must be enabled for HDCP "software key" decoding.
HDMI	High Definition Multimedia Interface
HP	HeadPhone
I	Monochrome TV system. Sound carrier distance is 6.0 MHz
I^2C	Inter IC bus
I^2D	Inter IC Data bus
I^2S	Inter IC Sound bus
IF	Intermediate Frequency
IR	Infra Red
IRQ	Interrupt Request
ITU-656	The ITU Radio communication Sector (ITU-R) is a standards body subcommittee of the International Telecommunication Union relating to radio communication. ITU-656 (a.k.a. SDI), is a digitized video format used for broadcast grade video. Uncompressed digital component or digital composite signals can be used. The SDI signal is self-synchronizing, uses 8 bit or 10 bit data words, and has a maximum data rate of 270 Mbit/s, with a minimum bandwidth of 135 MHz.
iTV	Institutional TeleVision; TV sets for hotels, hospitals etc.
LS	Last Status; The settings last chosen by the customer and read and stored in RAM or in the NVM. They are called at start-up of the set to configure it according to the customer's preferences
LATAM	Latin America
LCD	Liquid Crystal Display
LED	Light Emitting Diode
L/L'	Monochrome TV system. Sound carrier distance is 6.5 MHz. L' is Band I, L is all bands except for Band I
LPL	LG.Philips LCD (supplier)
LS	Loudspeaker
LVDS	Low Voltage Differential Signalling
Mbps	Mega bits per second
M/N	Monochrome TV system. Sound carrier distance is 4.5 MHz
MHEG	Part of a set of international standards related to the presentation of multimedia information, standardised by the Multimedia and Hypermedia Experts Group. It is commonly used as a language to describe interactive television services
MIPS	Microprocessor without Interlocked Pipeline-Stages; A RISC-based microprocessor
MOP	Matrix Output Processor
MOSFET	Metal Oxide Silicon Field Effect Transistor, switching device
MPEG	Motion Pictures Experts Group
MPIF	Multi Platform InterFace
MUTE	MUTE Line
MTV	Mainstream TV: TV-mode with Consumer TV features enabled (iTV)
NC	Not Connected
NICAM	Near Instantaneous Compounded Audio Multiplexing. This is a digital sound system, mainly used in Europe.
NTC	Negative Temperature Coefficient, non-linear resistor
NTSC	National Television Standard Committee. Color system mainly used in North America and Japan. Color carrier NTSC M/N= 3.579545 MHz, NTSC 4.43= 4.433619 MHz (this is a VCR norm, it is not transmitted off-air)
NVM	Non-Volatile Memory: IC containing TV related data such as alignments
O/C	Open Circuit
OSD	On Screen Display
OAD	Over the Air Download. Method of software upgrade via RF transmission. Upgrade software is broadcasted in TS with TV channels.
OTC	On screen display Teletext and Control; also called Artistic (SAA5800)
P50	Project 50: communication protocol between TV and peripherals
PAL	Phase Alternating Line. Color system mainly used in West Europe (colour carrier = 4.433619 MHz) and South America (colour carrier PAL M = 3.575612 MHz and PAL N = 3.582056 MHz)
PCB	Printed Circuit Board (same as "PWB")
PCM	Pulse Code Modulation

PDP	Plasma Display Panel
PFC	Power Factor Corrector (or Pre-conditioner)
PiP	Picture In Picture
PLL	Phase Locked Loop. Used for e.g. FST tuning systems. The customer can give directly the desired frequency
POD	Point Of Deployment: a removable CAM module, implementing the CA system for a host (e.g. a TV-set)
POR	Power On Reset, signal to reset the uP
PSDL	Power Supply for Direct view LED backlight with 2D-dimming
PSL	Power Supply with integrated LED drivers
PSLS	Power Supply with integrated LED drivers with added Scanning functionality
PTC	Positive Temperature Coefficient, non-linear resistor
PWB	Printed Wiring Board (same as "PCB")
PWM	Pulse Width Modulation
QRC	Quasi Resonant Converter
QTNR	Quality Temporal Noise Reduction
QVCP	Quality Video Composition Processor
RAM	Random Access Memory
RGB	Red, Green, and Blue. The primary color signals for TV. By mixing levels of R, G, and B, all colors (Y/C) are reproduced.
RC	Remote Control
RC5 / RC6	Signal protocol from the remote control receiver
RESET	RESET signal
ROM	Read Only Memory
RSDS	Reduced Swing Differential Signalling data interface
R-TXT	Red TeleteXT
SAM	Service Alignment Mode
S/C	Short Circuit
SCART	Syndicat des Constructeurs d'Appareils Radiorécepteurs et Téléviseurs
SCL	Serial Clock I^2C
SCL-F	CLock Signal on Fast I^2C bus
SD	Standard Definition
SDA	Serial Data I^2C
SDA-F	DAta Signal on Fast I^2C bus
SDI	Serial Digital Interface, see "ITU-656"
SDRAM	Synchronous DRAM
SECAM	SEequence Couleur Avec Mèmoire. Colour system mainly used in France and East Europe. Colour carriers = 4.406250 MHz and 4.250000 MHz
SIF	Sound Intermediate Frequency
SMPS	Switched Mode Power Supply
SoC	System on Chip
SOG	Sync On Green
SOPS	Self Oscillating Power Supply
SPI	Serial Peripheral Interface bus; a 4-wire synchronous serial data link standard
S/PDIF	Sony Philips Digital InterFace
SRAM	Static RAM
SRP	Service Reference Protocol
SSB	Small Signal Board
SSC	Spread Spectrum Clocking, used to reduce the effects of EMI
STB	Set Top Box
STBY	STand-BY
SVGA	800 × 600 (4:3)
SVHS	Super Video Home System
SW	Software
SWAN	Spatial temporal Weighted Averaging Noise reduction
SXGA	1280 × 1024
TFT	Thin Film Transistor
THD	Total Harmonic Distortion
TMDS	Transmission Minimized Differential Signalling
TS	Transport Stream
TXT	TeleteXT
TXT-DW	Dual Window with TeleteXT
UI	User Interface
uP	Microprocessor
UXGA	1600 × 1200 (4:3)
V	V-sync to the module
VESA	Video Electronics Standards Association
VGA	640 × 480 (4:3)
VL	Variable Level out: processed audio output toward external amplifier
VSB	Vestigial Side Band; modulation method
WYSIWYR	What You See Is What You Record: record selection that follows main picture and sound
WXGA	1280 × 768 (15:9)
XTAL	Quartz crystal
XGA	1024 × 768 (4:3)
Y	Luminance signal
Y/C	Luminance (Y) and Chrominance (C) signal
YPbPr	Component video. Luminance and scaled color difference signals (B-Y and R-Y)
YUV	Component video

4. Mechanical Instructions

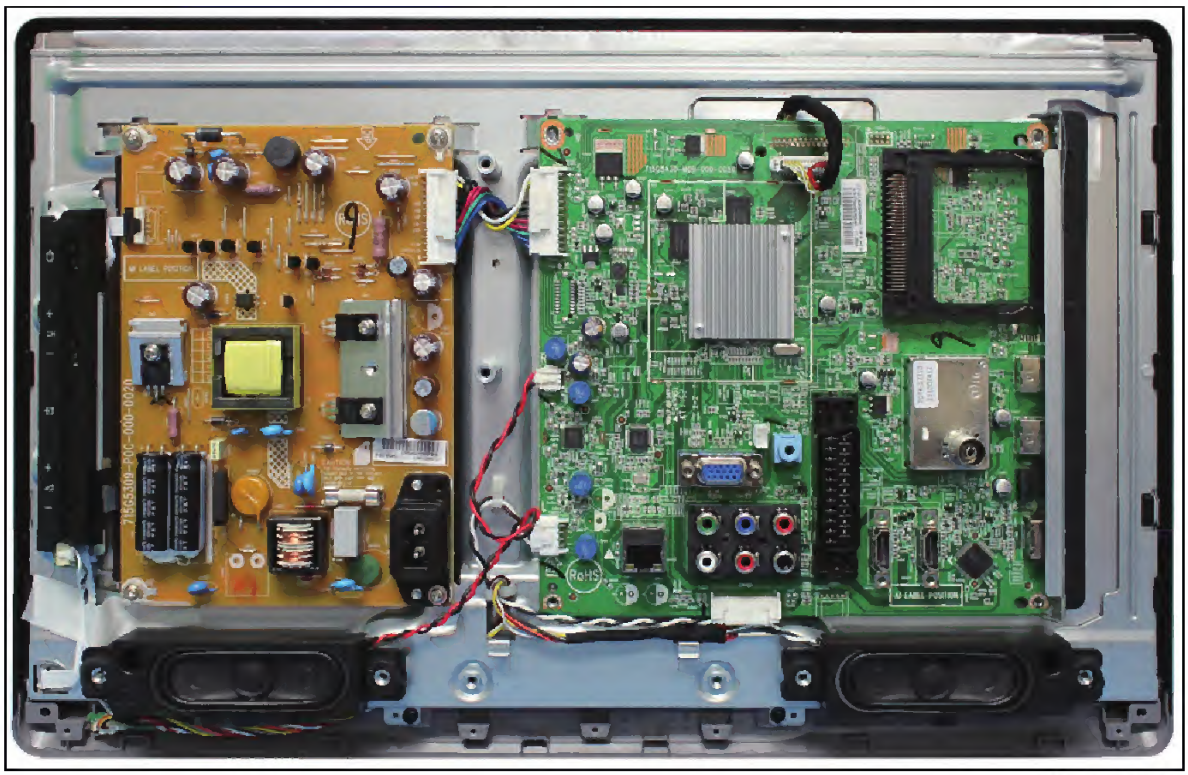
Index of this chapter:

4.1 Cable Dressing
4.2 Service Positions
4.3 Assembly/Panel removal for 22HFL3007 sets
4.4 Assembly/Panel removal for 22HFL3017 sets
4.5 Set Re-assembly

Notes:

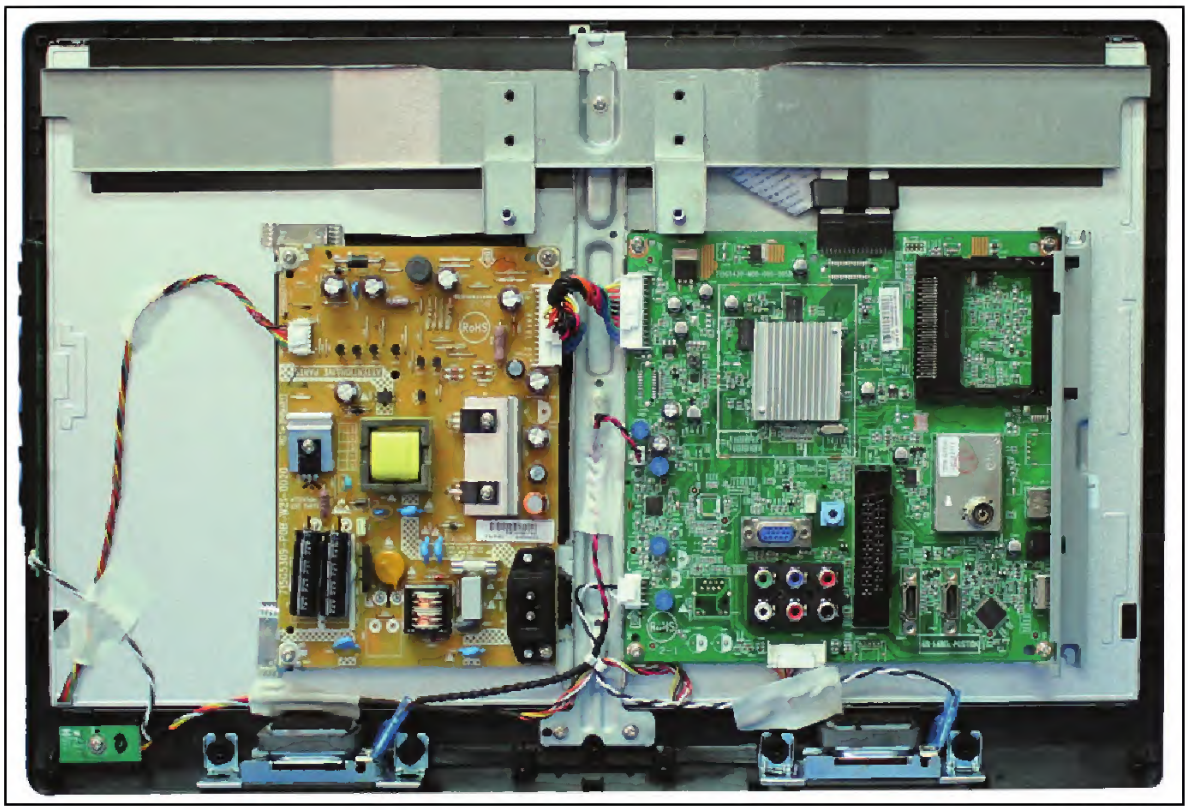
- Figures below can deviate slightly from the actual situation, due to the different set executions.

4.1 Cable Dressing



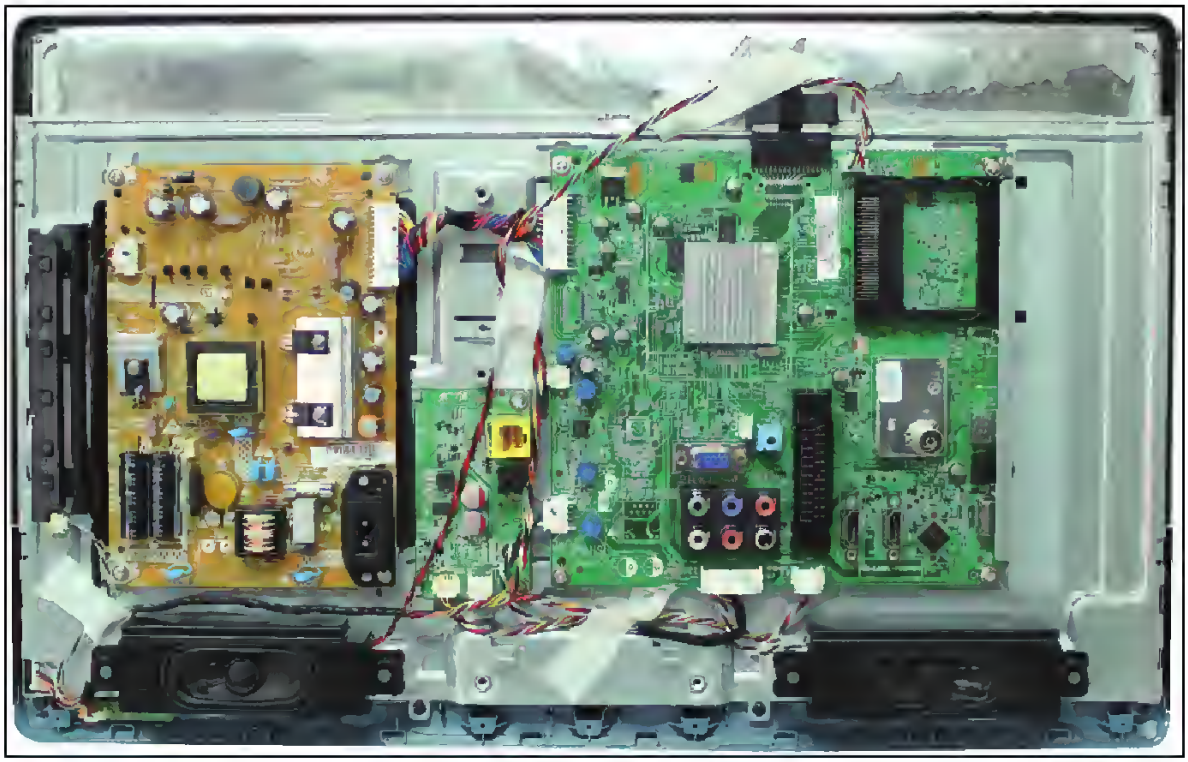
19270_100_120401.eps
120412

Figure 4-1 Cable dressing (19")



19380_100_120829.eps
120924

Figure 4-2 Cable dressing (22" 3007 series)



19380_101_120829.eps
120924

Figure 4-3 Cable dressing (22" 3017 series)

4.2 Service Positions

For easy servicing of a TV set, the set should be put face down on a soft flat surface, foam buffers or other specific workshop tools. Ensure that a stable situation is created to perform measurements and alignments. When using foam bars take care that these always support the cabinet and **never** only the display. **Caution:** Failure to follow these guidelines can seriously damage the display!
Ensure that ESD safe measures are taken.

4.3 Assembly/Panel removal for 22HFL3007 sets

4.3.1 Stand

Refer to Figure 4-4 for details.

1. Remove fixation screws [1] that secure the stand, pull out the stand downwards from the set.

19380_102_120903.eps
120924

Figure 4-4 Stand removal

4.3.2 Rear Cover

Refer to Figure 4-5 for details.
Warning: Disconnect the mains power cord before removing the rear cover.

1. Remove the fixation screws [1,2] that secure the rear cover.
2. Lift the rear cover from the TV. Make sure that wires and flat foils are not damaged while lifting the rear cover from the set.

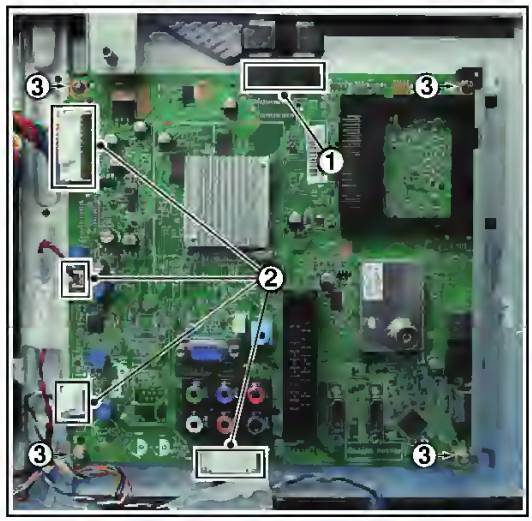
19380_103_120903.eps
120924

Figure 4-5 Rear cover removal

4.3.3 Small Signal Board (SSB)

Refer to Figure 4-6 for details.
Caution: It is mandatory to remount all different screws at their original position during re-assembly. Failure to do so may result in damaging the SSB.

1. Release the clips from the LVDS/Flat Foil connector that connect with the SSB [1].
   Caution: be careful, as these are very fragile connectors! Take the flat foils out of their connectors.
2. Release the clamps and unplug all other connectors [2].
3. Remove all the fixation screws from the SSB [3].
4. The SSB can now be shifted from side connector cover, then lifted and taken out of the I/O bracket. Refer to Figure 4-6 for details.



19380_104_120903.eps
120903

Figure 4-6 SSB removal

4.3.4 Power Supply Unit (PSU)

Caution: it is mandatory to remount all different screws at their original position during re-assembly. Failure to do so may result in damaging the PSU.

1. Unplug all connectors from the PSU.
2. Remove all fixation screws from the PSU.
3. The PSU can be taken out of the set now.

4.3.5 Speakers

1. Gently release the tapes that secures the speaker cables.
2. Unplug the speaker connectors from the SSB.
3. Take the speakers out.

When defective, replace the both units.

4.3.6 Keyboard Control unit

1. Unplug the connector from the keyboard control panel.
2. Gently push inwards the two clips at the PSU side of the unit. Release the unit at the PSU side and turn it away from the PSU. Now push it towards the PSU to release the catches at the other side of the unit. Take it out from the metal bracket.

When defective, replace the whole unit.

4.3.7 IR/LED Board

1. Unplug the connector from the IR/LED board.
2. Gently release the clip that holds the board and take it out from the bezel.

When defective, replace the whole unit.

4.3.8 LCD Panel

1. Unplug the IR/LED connector cable.
2. Remove the fixations screws that secure the subframe to the panel.
3. Release the clips at the side of the LCD panel.
4. Lift the subframe with PSU, SSB and Keyboard control panel from the LCD panel and put it aside.
5. Lift the LCD Panel from the bezel.

When defective, replace the whole unit.

4.4 Assembly/Panel removal for 22HFL3017 sets

4.4.1 Stand

Refer to Figure 4-7 for details.

1. Remove fixation screws [1,2] that secure the base assembly, pull the base assembly downwards away from the catches. Do not release the two screws in the middle of the stand.

4.4.2 Rear Cover

Refer to Figure 4-7 for details.

Warning: Disconnect the mains power cord before removing the rear cover.

1. Remove fixation screws [1]and [2] that secure the rear cover.
2. At the top side the rear cover is locked by catches, so gently lift the bottom side and push the cover upwards to release these catches. Then lift the cover from the TV. Make sure that cabling and wires are not damaged while lifting the rear cover from the set.

19380_105_120905.eps
120924

Figure 4-7 Rear cover removal

4.4.3 Power Supply Unit (PSU)

Caution: it is mandatory to remount all different screws at their original position during re-assembly. Failure to do so may result in damaging the PSU.

1. Unplug all connectors from the PSU.
2. Remove the fixation screw located right side of the mains inlet connector.
3. Remove the other four fixation screws located at the corners of the panel.
4. The PSU can be taken out of the set now.

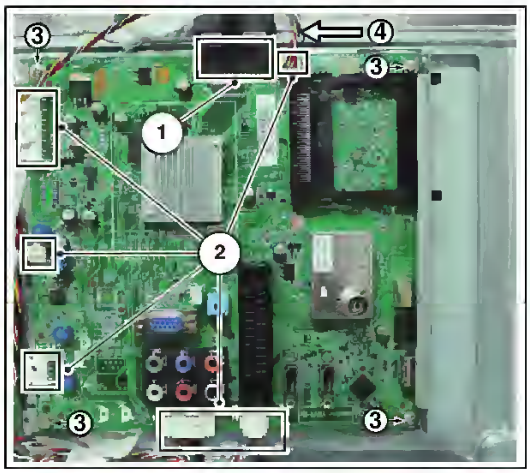
When defective, replace the whole unit

4.4.4 Small Signal Board (SSB)

Refer to Figure 4-8 for details.

Caution: it is mandatory to remount all different screws at their original position during re-assembly. Failure to do so may result in damaging the SSB.

1. Release the clips from the LVDS cable connector that connects the panel to the SSB [1].
   Caution: be careful, as these are very fragile connectors!
2. Release the clamps and unplug all other connectors [2].
3. Remove all the fixation screws from the SSB [3].
4. Take out the SSB with I/O bracket
5. The SSB can now be shifted away[4] from side connector cover and lifted from the set.



19380_106_120905.eps
120925

Figure 4-8 SSB removal

4.4.5 Speakers

1. Gently release the tapes that holds the speaker cables.
2. Unplug the speaker connector from the SSB.
3. Take the speakers out.

When defective, replace both units.

4.4.6 Keyboard Control unit

1. Gently release the tape that holds the board's cable.
2. Gently push inwards the three clips at the PSU side of the unit. Release the unit at the PSU side and turn it away from the PSU. Now push it towards the PSU to release the catches at the other side of the unit. Take it out from the metal bracket.
3. Unplug the connector from the keyboard control unit.

When defective, replace the whole unit.

4.4.7 IR/LED Board

1. Remove the stand as described earlier.
2. Gently release the clip of the panels cover on the left side, and take out the cover from the bezel.
3. Gently release the clip at the right side of the panel, and take the panel from the bezel.
4. Unplug the connector from the IR/LED board.

When defective, replace the whole unit.

4.4.8 LCD Panel

1. Remove the stand as described earlier
2. Remove the SSB as described earlier.
3. Remove the PSU as described earlier.
4. Remove the speakers as described earlier.
5. Remove the keyboard control unit as described earlier.
6. Remove the IR/LED board as described earlier.
7. Remove all other metal parts that do not belong to the LCD panel.
8. Release all fixing clips that secure the front bezel to the LCD panel.
9. Lift the LCD Panel from the front bezel.

When defective, replace the whole unit.

4.5 Set Re-assembly

To re-assemble the whole set, execute all processes in reverse order.

Notes:

- While re-assembling, make sure that all cables are placed and connected in their original position. See Figure 4-1 to Figure 4-3.
- Pay special attention not to damage the EMC foams on the SSB shields. Ensure that EMC foams are mounted correctly

5. Service Modes, Error Codes, and Fault Finding

Index of this chapter:

5.1 Test Points
5.2 Service Modes
5.3 Stepwise Start-up
5.4 Service Tools
5.5 Software Upgrading
5.6 Error Codes
5.7 The Blinking LED Procedure
5.8 Fault Finding and Repair Tips

5.1 Test Points

As most signals are digital, it will be difficult to measure waveforms with a standard oscilloscope. However, several key ICs are capable of generating test patterns, which can be controlled via ComPair. In this way it is possible to determine which part is defective.

Perform measurements under the following conditions:
- Service Default Mode.
- Video: Colour bar signal.
- Audio: 3 kHz left, 1 kHz right.

5.2 Service Modes

The Service Mode feature is split into five parts:
- Service Default Mode (SDM).
- Service Alignment Mode (SAM).
- Factory Mode.
- Customer Service Mode (CSM).
- Computer Aided Repair Mode (ComPair).

SDM, SAM and the Factory mode offer features, which can be used by the Service engineer to repair/align a TV set. Some features are:
- A pre-defined situation to ensure measurements can be made under uniform conditions (SDM).
- Activates the blinking LED procedure for error identification when no picture is available (SDM).
- Make alignments (e.g. White Tone), reset the error buffer (SAM and Factory Mode).
- Display information ("SDM" or "SAM" indication in upper right corner of screen, error buffer, software version, operating hours, options and option codes, sub menus).

The CSM is a Service Mode that can be enabled by the consumer. The CSM displays diagnosis information, which the customer can forward to the dealer or call centre. In CSM mode, "CSM", is displayed in the top right corner of the screen. The information provided in CSM and the purpose of CSM is to:
- Increase the home repair hit rate.
- Decrease the number of nuisance calls.
- Solved customers' problem without home visit.

ComPair Mode is used for communication between a computer and a TV on I^2C /UART level and can be used by a Service engineer to quickly diagnose the TV set by reading out error codes, read and write in NVMs, communicate with ICs and the micro processor (PWM, registers, etc.), and by making use of a fault finding database. It will also be possible to up and download the software of the TV set via I^2C with help of ComPair. To do this, ComPair has to be connected to the TV set via the ComPair connector, which will be accessible through the rear of the set (without removing the rear cover).

Note: For the new model range, a new remote control (RC) is used with some renamed buttons. This has an impact on the activation of the Service modes. For instance the old "MENU" button is now called "HOME" (or is indicated by a "house" icon).

5.2.1 General

Next items are applicable to all Service Modes or are general.

Life Timer

During the life time cycle of the TV set, a timer is kept (called "Op. Hour"). It counts the normal operation hours (not the Stand-by hours). The actual value of the timer is displayed in SDM and SAM in a decimal value. Every two soft-resets increase the hour by + 1. Stand-by hours are not counted.

Software Identification, Version, and Cluster

The software ID, version, and cluster will be shown in the main menu display of SDM, SAM, and CSM.
The screen will show: "AAAAB-X.YYY", where.
- AAAA is the chassis name: T911HE x.yyy.
- B is the region indication. E = Europe, A = AP/China, U = NAFTA, L = LATAM.
- X is the main version number: this is updated with a major change of specification (Incompatible with the previous software version). Numbering will go from 1 - 99 and AA - ZZ.
  - If the main version number changes, the new version number is written in the NVM.
  - If the main version number changes, the default settings are loaded.
- YYY is the sub version number: this is updated with a minor change (backwards compatible with the previous versions). Numbering will go from 000 - 999.
  - If the sub version number changes, the new version number is written in the NVM.
  - If the NVM is refreshed, the software identification, version, and cluster will also be written to NVM.

Display Option Code Selection

When after an SSB or display exchange, the display option code is not set properly, it will result in a TV with "no display". Therefore, it is required to set this display option code after such a repair.
To do so, press the following key sequence on a standard RC transmitter: "062598" directly followed by MENU and "xxx", where "xxx" is a 3 digit decimal value of the panel type: see column "Display Code" in Table 6-3. When the value is accepted and stored in NVM, the set will switch to Stand-by, to indicate that the process has been completed.
During this algorithm, the NVM-content must be filtered, because several items in the NVM are TV-related and not SSB related (e.g. Model and Prod. S/N). Therefore, "Model" and "Prod. S/N" data is changed into "See Type Plate". In case a call centre or consumer reads "See Type Plate" in CSM mode.

5.2.2 Service Default Mode (SDM)

Purpose

Set the TV in SDM mode in order to be able to create a predefined setting for measurements to be made. In this platform, a simplified SDM is introduced (without protection override and without tuning to a predefined frequency).

Specifications
- Set linear video and audio settings to 50%, but volume to 25%. Stored user settings are not affected.
- All service-unfriendly modes (if present) are disabled, since they interfere with diagnosing/repairing a set. These service unfriendly modes are:
  - (Sleep) timer.
  - Blue mute/Wall paper.
  - Auto switch "off" (when there is no "ident" signal).
  - Hotel or hospital mode.
  - Child lock or parental lock (manual or via V-chip).
  - Skipping, blanking of "Not favourite", "Skipped" or "Locked" presets/channels.
  - Automatic storing of Personal Preset or Last Status settings.

- Automatic user menu time-out (menu switches back/OFF automatically.
- Auto Volume levelling (AVL).

How to Activate SDM

To activate SDM, use the following methods.

- Press the following key sequence on the RC transmitter: "062596", directly followed by the "Home" button.

After activating this mode, "SDM" will appear in the upper left corner of the screen.

On Screen Menu

After activating SDM, the following items are displayed, with SDM in the upper right corner of the screen to indicate that the television is in Service Default Mode. Menu items and explanation:

- **xxxxx** Operating hours (in decimal).
- **AAAAB-X.YYY** See Software Identification, Version, and Cluster for the software name definition.
- **ERR** Shows all errors detected since the last time the buffer was erased in format <xxx> <xxx> <xxx> <xxx> <xxx> (five errors possible).
- ***OP*** Used to read-out the option bytes. In this chassis two times eight option codes are used.

How to Navigate

As this mode is read only, there is nothing to navigate. To switch to other modes, use one of the following methods.

- Command MENU from the user remote will exit SDM.
- To prevent the OSD from interfering with measurements in SDM, use the command "Adjust" or "Options" ("STATUS" or "INFO" for NAFTA and LATAM) from the user remote. This will switch the OSD "off" while remaining in the SDM mode. The "SDM" OSD is remains visible in the upper right corner of the screen. To exit SDM switch to "Stand-by" mode.
- Press the following key sequence on the remote control transmitter: "062596" directly followed by the OK button to switch to SAM (do not allow the display to time out between entries while keying the sequence). Remarks. new remote controls will not have I+ button, but an "INFO" button instead.

How to Exit SDM

- Switch the set to Stand-by by pressing the standby button on the remote control transmitter or on the television set.
- Via a standard customer RC-transmitter: key in "00"-sequence.

  Note: If the TV is switched "off" by a power interrupt while in SDM, the TV will show up in the last status of SDM menu as soon as the power is supplied again. The error buffer will not be cleared.

5.2.3 Service Alignment Mode (SAM)

Purpose

- To modify the NVM.
- To display/clear the error code buffer.
- To perform alignments.

Specifications

- Operation hours counter (maximum five digits displayed).
- Software version, error codes, and option settings display.
- Error buffer clearing.
- Option settings.
- Software alignments (White Tone).
- NVM Editor.
- Set screen mode to full screen (all content is visible).

How to Activate SAM

To activate SAM, use one of the following methods:

- Press the following key sequence on the remote control transmitter: "062596", directly followed by the "INFO" button. Do not allow the display to time out between entries while keying the sequence.
- Or via ComPair.

After entering SAM, the following items are displayed, with "SAM" in the upper right corner of the screen to indicate that the television is in Service Alignment Mode.

Table 5-1 SAM mode overview

Main Menu	Sub-menu 1	Sub-menu 2	Description
System Information	Op Hour		This represents the life timer. The timer counts normal operation hours, but does not count Stand-by hours
	Main SW ID	e.g. "T91HE 1 178A"	See paragraph Software Identification, Version, and Cluster for the software name definition
	ERR	e.g. "000 000 000 000 000"	Shows all errors detected since the last time the buffer was erased. Five errors possible
	OP1	e.g. "012 007 208 002 184 032 007 030"	Used to read out the option bytes. See paragraph 6.4 Option Settings in the Alignments section for a detailed description. Ten codes are possible.
	OP2	e.g. "056 023 000 106 064 000 000 122"	
Clear	Press [OK] to clear the Error Codes immediately		Erases the contents of the error buffer. Select this menu item and press the MENU RIGHT key on the remote control. The content of the error buffer is cleared
RGB Align	Warm	R Gain	To align the White Tone. See paragraph 6.3 Software Alignments in the Alignments section for a detailed description
		G Gain	
		B Gain	
	Normal	R Gain	
		G Gain	
		B Gain	
	Cool	R Gain	
		G Gain	
		B Gain	
	Store		Store the RGB value
NVM editor	Address		Select and fill the NVM address
	Value		Select and fill the NVM value
	Store		Store the value in the address
Upload to USB	Copy Channel List to USB		To upload several settings from the TV to an USB stick
	Copy NVM to USB		
	Copy Readable Info to USB		
	Copy EDID to USB		

Main Menu	Sub-menu 1	Sub-menu 2	Description
Download from USB	Copy Channel List from USB		To download several settings from the USB stick to the TV
	Copy NVM from USB		
	Copy Readable Info from USB		
	Copy EDID from USB		
Initialize NVM	Press [OK] to Initialize NVM immediately		To initialize a (corrupted) NVM. Be careful, this will erase all settings
EDID Write Enable	Press [OK] to enable EDID writable immediately		Enable EDID for writing
Service Data	Type Number	Press [OK] use key pad edit type number immediately	Edit and display the applicable service data by using the displayed key pad
	Production Number	Press [OK] use key pad edit production number immediately	
	12NC SSB	Press [OK] use key pad edit SSB immediately	
	12NC PSU	Press [OK] use key pad edit PSU immediately	
	12NC Display	Press [OK] use key pad edit display immediately	
Clear OAD Version	Press [OK] to clean OAD Version immediately		Clean OAD (Over Air Download, firmware update method) Version
Reload_MAC_address	Press [OK] to reload MAC address from ECD immediately		If MAC address value in NVM is missing, you can trigger this item in SAM mode to reload MAC address from flash ECD key to NVM

How to Navigate

- In the SAM menu, select menu items with the UP/DOWN keys on the remote control transmitter. The selected item will be indicated. When not all menu items fit on the screen, use the UP/DOWN keys to display the next/previous menu items.
- With the "LEFT/RIGHT" keys, it is possible to:
  - (De) activate the selected menu item.
  - (De) activate the selected sub menu.
  - Change the value of the selected menu item.
- When you press the MENU button once while in top level SAM, the set will switch to the normal user menu (with the SAM mode still active in the background).
- Press the following key sequence on the remote control transmitter: "062596" directly followed by the "Home" button to switch to SDM (do not allow the display to time out between entries while keying the sequence).

How to Store SAM Settings

To store the settings changed in SAM mode (except the RGB Align settings), leave the top level SAM menu by using the POWER button on the remote control transmitter or the television set. The mentioned exceptions must be stored separately via the STORE button.

How to Exit SAM

Use one of the following methods:

- Switch the set to STANDBY by pressing the mains button on the remote control transmitter or the television set.
- Via a standard RC-transmitter, key in "00" sequence.

Note. When the TV is switched "off" by a power interrupt while in SAM, the TV will show up in "normal operation mode" as soon as the power is supplied again. The error buffer will not be cleared.

5.2.4 Contents of the Factory mode:

Purpose

- To perform extended alignments.

Specifications

- Displaying and or changing Panel ID information.
- Displaying and or changing Tuner ID information.
- Error buffer clearing.
- Various software alignment settings.
- Testpattern displaying.
- Public Broadcasting Service password Reset.
- etc.

How to Activate the Factory mode

To activate the Factory mode, use the following method:

- Press the following key sequence on the remote control transmitter: from the "Home screen" press "1999", directly followed by the "Back" button. Do not allow the display to time out between entries while keying the sequence.

After entering the Factory mode, the following items are displayed,

Table 5-2 Factory mode overview

Item	Item value	Default value 19"	Default value 22"	Description
0	F/W VERSION	Press OK		Displays the software versions of the supplier, Flash PQ, Smart Picture, BL Dimming, Source Meter, the Picture Quality checksum, the Dimming library, the Source meter library, the Flash AQ, the MTK, MCU and OAD software versions
1	Panel_ID	See table 6-3 Display code overview		Displays and changes the Panel ID with the left and right cursor, be careful changing this, it can result in not correct displaying the screen!
2	Tuner ID	105: LG TDTK G731D		Displays and changes the Tuner ID with the left and right cursor. Not to be changed when the tuner is replaced with the correct service part
3	ERR Code: xxx xxx xxx xxx xxx	000 000 000 000 000		Values showing the last 5 errors during the last 50 hours of operation, according to table 5-4 Error code table
4	CLEAR ERROR BUFFER	Press OK		Selecting this clear all current error codes
5	NVM ADDRESS	0		NVM address 0 to 8191, Use Item 6 to change and 7 to store the data to the correct NVM address
6	NVM VALUE	various		Displays the value at the NVM address of item 5
7	NVM STORE	Press OK		Use this option to save the data of Item 6 to NVM address of Item 5

Item	Item value	Default value 19"	Default value 22"	Description
8	NVM COPY TV to USB	Press OK		Use this to store the NVM data to the REPAIR folder of a FAT formatted USB memory stick. The TV will write two files in the REPAIR folder of the memory stick. It will create this folder if it does not exist. The items are "Channel list", "Personal settings", "Option codes", "Display-related alignments" and "History list". In case the download to the USB stick was not successful "Failure" will appear. In this case, check if the USB stick is connected properly. Now the settings are stored onto the USB stick and can be used to download onto another TV or other SSB. Uploading is of course only possible if the software is running and if a picture is available. This method is created to be able to save the customer's TV settings and to store them into another SSB.
9	NVM COPY USB to TV	Press OK		Use this to store the NVM data from the USB memory stick to the TV. The TV will save the two files which were created in item 8 to the NVM of the set. Use these options when replacing a SSB. When "USB to TV Success" is displayed remove the power and restart the TV.
10	RESET_PBS_PWD	Press OK		Use this to reset the Child Lock
11	DIM_LIB_RESET	Press OK		Reset the Dimming
12	SRC_METER RESET	Press OK		Reset the Source meter
13	CIPLUS_QUERY	Press OK		Shows the Validity of the CI+ key and the supplier information
14	CIPLUS UPDATE	Press OK		Used to enter a new CI+ code into the NVM. This can only be used when no CI+ code exists in the NVM
15	EDID UPDATE	Press OK		Used to enter a new EDID codes into the NVM
16	Test Pattern	Press OK		With the "left" and "right" keys of the remote control various test patterns can be chosen
17	VIRGIN_MODE	Off/On		Use this to return the set to virgin mode. Depends whether the set has been used already.
18	E-Fuse	On		E-fuse mode
18	ORT_MODE	Off		ORT mode
20	VGA_UART_SWITCH	Off		When switched "on" the VGA port can be used for UART logging
21	AGEING MODE	Off		Use this for ageing a new LCD panel
22	CLR_TEMP_R	128	98	Red colour temperature setting
23	CLR_TEMP_G	128	107	Green colour temperature setting
24	CLR_TEMP_B	128	128	Red colour temperature setting
25	AUTO_COLOR	Press OK		PC: any pattern that has black and white, YPbPr: SMPTE bar (colour bar), any timing
26	ADC_GAIN_R	74	72	Red ADC gain
27	ADC_GAIN_G	70	78	Green ADC gain
28	ADC_GAIN_B	69	73	Blue ADC gain
29	ADC_OFFSET_R	96	88	Red ADC offset
30	ADC_OFFSET_G	98	81	Green ADC offset
31	ADC_OFFSET_B	89	86	Blue ADC offset
32	YPBPR_PHASE	InValid		Not available for this chassis
33	AUD_LIMITER_MODE	2		Three modes, 0: off, 1: adaptive mode, 2: fixed mode
34	AUD_THRESHOLD_BYTE1	0		Limit threshold
35	AUD_THRESHOLD_BYTE2	10		Limit threshold
36	AUD_THRESHOLD_BYTE3	6		Limit threshold
37	AUD_GAIN_LINEIN	3		Line-In audio gain
38	AUD_GAIN_HDMI	2		HDMI audio gain
39	AUD_GAIN_ATV	3		Analogue TV audio gain
40	AUD_GAIN_DTV	2		Digital TV audio gain
41	AUD_GAIN_USB	2		USB audio gain
42	AQ_INDEX	4	5	Audio Quality index
43	Audio Test Mode	Off		Used for audio testing during production
44	Audio Channel Type	2.0		Defines the installed speaker system
45	DUMP PQ FROM TV	Press OK		Saves the picture quality data to a file "pq.bin" to the root of a FAT formatted USB memory stick
46	LOAD PQ to TV	Press OK		Loads the picture quality data from a file "pq.bin" in to the TV
47	DUMP AQ FROM TV	Press OK		Saves the audio quality data to a file "AQ.bin" to the root of a FAT formatted USB memory stick
48	LOAD AQ to TV	Press OK		Loads the audio quality data from a file "AQ.bin" in to the TV
49	FEF CHECK	Off		FEF CHECK
50	EXIT_FACTORY	Press OK		Exits the Factory mode

How to Exit the Factory mode

Use one of the following methods:

- Select EXIT_FACTORY from the menu and press the "OK" button.

Note: When the TV is switched "off" by a power interrupt, or normal switch to "stand-by" while in the factory mode, the TV will show up in "normal operation mode" as soon as the power is supplied again. The error buffer will not be cleared.

5.2.5 Customer Service Mode (CSM)

Purpose

The Customer Service Mode shows error codes and information on the TV's operation settings. The call centre can instruct the customer (by telephone) to enter CSM in order to identify the status of the set.This helps the call centre to diagnose problems and failures in the TV set before making a service call.

The CSM is a read-only mode, therefore, modifications are not possible in this mode.

Specifications

- Ignore "Service unfriendly modes".
- Line number for every line (to make CSM language independent).
- Set the screen mode to full screen (all contents on screen is visible).
- After leaving the Customer Service Mode, the original settings are restored.
- Possibility to use "CH+" or "CH-" for channel surfing, or enter the specific channel number on the RC.

How to Activate CSM

To activate CSM, press the following key sequence on a standard remote control transmitter: "123654" (do not allow the display to time out between entries while keying the sequence). After entering the Customer Service Mode, the following items are displayed.

Note: Activation of the CSM is only possible if there is no (user) menu on the screen!

Contents of CSM

- **1.1 Set Type** This information is very helpful for a helpdesk/workshop as reference for further diagnosis. In this way, it is not necessary for the customer to look at the rear of the TV-set. Note that if an NVM is replaced or is initialized after corruption, this set type has to be re-written to NVM.
- **1.2 Production code** Displays the production code (the serial number) of the TV. Note that if an NVM is replaced or is initialized after corruption, this production code has to be re-written to NVM.
- **1.3 Installation date** Indicates the date of the first installation of the TV. This date is acquired via time extraction.
- **1.4 Option Code 1** Gives the option codes of option group 1 as set in SAM.
- **1.5 Option Code 2** Gives the option codes of option group 2 as set in SAM.
- **1.6 SSB** Gives an identification of the SSB as stored in NVM. Note that if an NVM is replaced or is initialized after corruption, this identification number has to be re-written to NVM. This identification number is the 12NC number of the SSB.
- **1.7 Display** 12NC NVM read/write.
- **1.8 PSU** 12NC NVM read/write.
- **2.1 Current Main SW** Displays the built-in main software version. In case of field problems related to software, software can be upgraded. As this software is consumer upgradeable, it will also be published on the internet.
- **2.2 Standby SW** Displays the built-in stand-by processor software version. Upgrading this software will be possible via USB.
- **2.3 Panel Code** Displays the Display Code number.
- **2.4 NVM version** Detects and displays NVM version.
- **2.5 Error Codes** Detects and displays errors.
- **3.1 Signal Quality** Analog/digital signal strength.
- **3.2 Child lock** Not active / active. This is a combined item for locks. If any lock (channel lock, parental lock) is active, it is indicated as "active".
- **3.3 HDCP keys** Indicates the validity of the HDMI keys (or HDCP keys). In case these keys are not valid and the customer wants to make use of the HDMI functionality, the SSB has to be replaced.
- **3.4 Ethernet MAC address** A Media Access Control address (MAC address) is a unique identifier assigned to network interfaces for communications on the physical network segment.
- **3.5 Wireless MAC address** Wireless Media Access Control address.

How to Navigate

By means of the "CURSOR-DOWN/UP" knob (or the scroll wheel) on the RC-transmitter, can be navigated through the menus.

How to Exit CSM

To exit CSM, use one of the following methods.

- Press the MENU/HOME button on the remote control transmitter.
- Press the POWER button on the remote control transmitter.
- Press the POWER button on the television set.

5.3 Stepwise Start-up

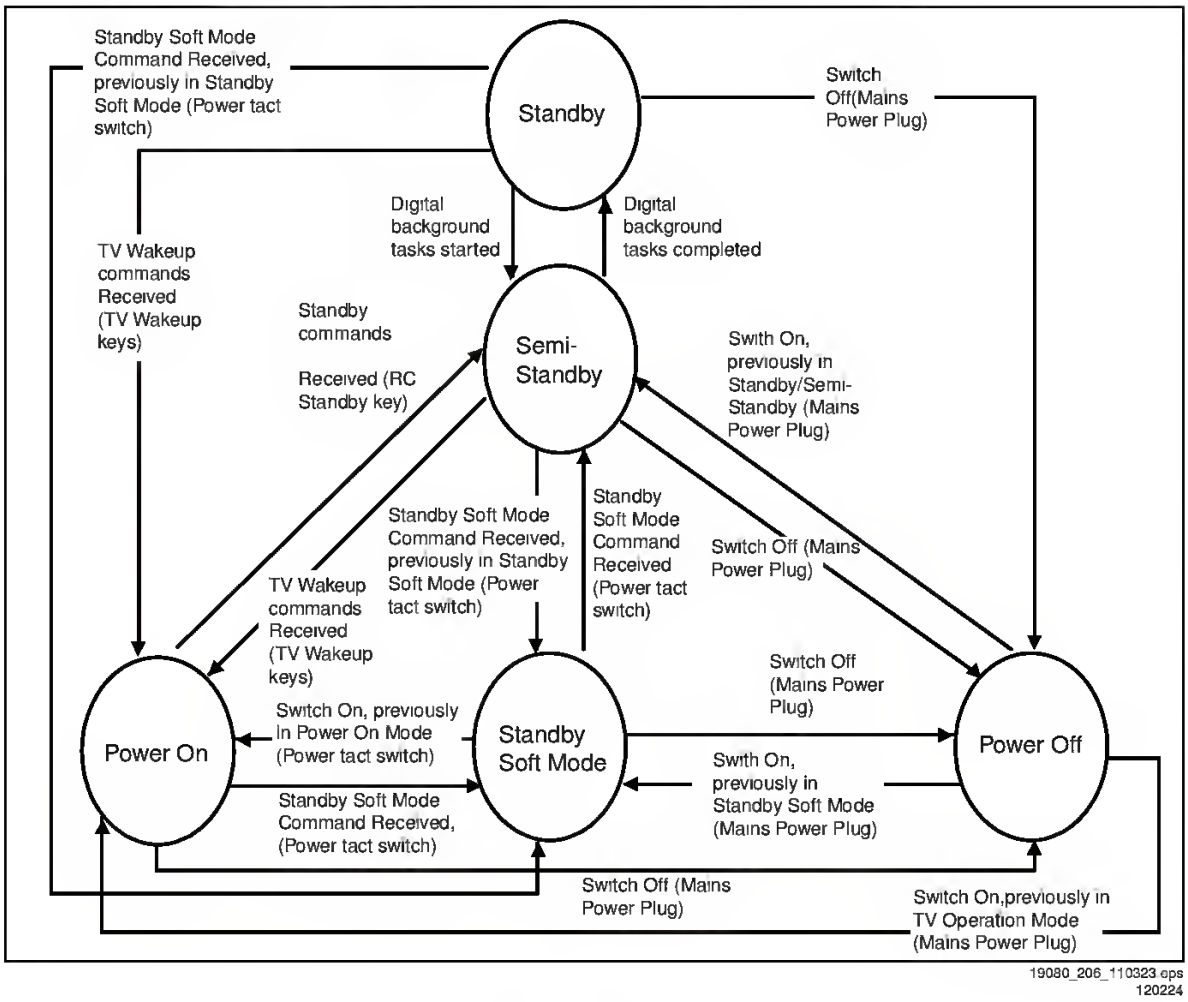

Standby Soft Mode Command Received, previously in Standby Soft Mode (Power tact switch)
Standby
Switch Off(Mains Power Plug)
Digital background tasks started
Digital background tasks completed
TV Wakeup commands Received (TV Wakeup keys)
Standby commands
Received (RC Standby key)
Semi-Standby
Swith On, previously in Standby/Semi-Standby (Mains Power Plug)
Standby Soft Mode Command Received, previously in Standby Soft Mode (Power tact switch)
Standby Soft Mode Command Received (Power tact switch)
Switch Off (Mains Power Plug)
TV Wakeup commands Received (TV Wakeup keys)
Switch Off (Mains Power Plug)
Power On
Switch On, previously in Power On Mode (Power tact switch)
Standby Soft Mode
Power Off
Swith On, previously in Standby Soft Mode (Mains Power Plug)
Standby Soft Mode Command Received, (Power tact switch)
Switch Off (Mains Power Plug)
Switch On,previously in TV Operation Mode (Mains Power Plug)
19080_206_110323 eps
120224

Figure 5-1 Stepwise Start-up

5.4 Service Tools

5.4.1 ComPair

Introduction

ComPair (Computer Aided Repair) is a Service tool for Philips Consumer Electronics products. and offers the following:

1. ComPair helps to quickly get an understanding on how to repair the chassis in a short and ettective way.
2. ComPair allows very detailed diagnostics and is therefore capable ot accurately indicating problem areas. No knowledge on I^2C or UART commands is necessary, because ComPair takes care of this.
3. ComPair speeds up the repair time since it can automatically communicate with the chassis (when the micro processor is working) and all repair information is directly available.
4. ComPair features TV software up possibilities.

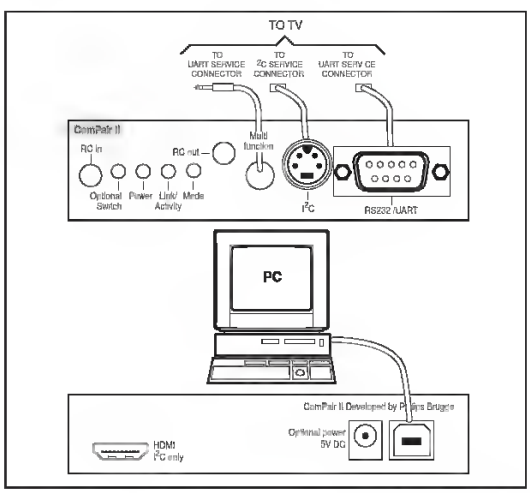
Specifications

ComPair consists of a Windows based fault finding program and an interface box between PC and the (defective) product. The ComPair II interface box is connected **to the PC** via an USB cable. For the TV chassis, the ComPair interface box and the TV communicate via a bi-directional cable via the service connector(s).

The ComPair fault finding program is able to determine the problem ot the detective television, by a combination ot automatic diagnostics and an interactive question/answer procedure.

How to Connect

This is described in the chassis fault finding database in ComPair.



10000_036_090121.eps
091118

Figure 5-2 ComPair II interface connection

Caution: It is compulsory to connect the TV to the PC as shown in the picture above (with the ComPair interface in between), as the ComPair interface acts as a level shifter. If one connects the TV directly to the PC (via UART), ICs can be blown!

How to Order

ComPair II order codes:

- ComPair II interface: 3122 785 91020.
- Software is available via the Philips Service web portal.
- ComPair UART interface cable for TPM9.3x xx. (using DB9 to 2mm pitch JST connector): 3122 785 90630.

Note: When you encounter problems, contact your local support desk.

5.5 Software Upgrading

5.5.1 Description

It is possible tor the user to upgrade the main software via the USB port. This allows replacement of a software image in a stand alone set. A description on how to upgrade the main software can be found in the DFU or on the Philips website.

5.5.2 Introduction

Philips continuously tries to improve its products, and it's recommend that the TV software is updated when updates are available. Software update files can be obtained from the dealer or can be downloaded from the following websites: http://www.philips.com/support

Preparing a portable memory for software upgrade

The following requirements have to be met:

1. A personal computer connected to the internet.
2. An archive utility that supports the ZIP-format (e.g. WinZip for Windows or StuffIt for Mac OS).
3. A FAT formatted USB memory stick (preferably empty).

Note:

1. Only FAT/DOS-formatted memory sticks are supported.
2. Only use software update files that can be found on the http://www.philips.com/support web site.

5.5.3 Check the current TV software version

Before starting the software upgrade procedure, it is advised to check that what the current TV software:

1. Press the "1 2 3 6 5 4" button on the remote control to enter the CSM mode.
2. Use the up/down cursor keys to select "Current Main Software".

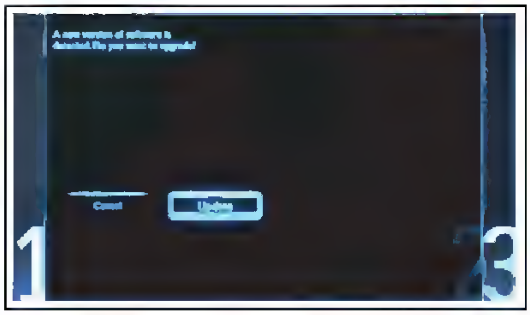
If the current software version ot the TV is the same as the latest update file found on http://www.philips.com/support, it is not necessary to update the TV software.

5.5.4 Download the latest software

1. Open the internet page http://www.philips.com/support.
2. Find information and software related to the TV.
3. Select the latest software update file and download it to the PC.
4. Insert the USB memory stick into one of the USB ports of the PC.
5. Decompress the downloaded ZIP file and copy the "autorun.upg" to the root directory of the USB flash drive.

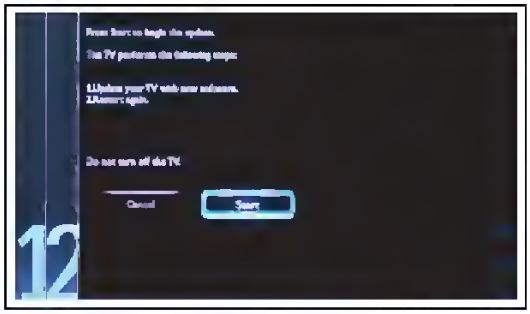
5.5.5 Update the TV software

1. Turn the TV on and wait for it to boot completely.
2. Insert the USB memory stick that contains the software update files in one of the TV's USB ports.
3. The TV will detect the USB memory stick automatically. Then a window jumps out as Figure 5-3.
   Note: If the USB flash drive is not detected after power up, disconnect it and re-insert it.
4. Select [Update] and press OK. See Figure 5-3.
5. To proceed, in next menu select [Start] and press OK to start software updates. See Figure 5-4.
6. Upgrading will now begins and the status of the updating progress will be displayed.
7. When the TV software is updated. Remove your USB flash drive, then select [Restart] and press OK to restart the TV.See Figure 5-5.



19080_207_110324.eps
110324

Figure 5-3 Update the TV software [1/3]



19080_208_110324.eps
110324

Figure 5-4 Update the TV software [2/3]

19080_209_110324.eps
110324

Figure 5-5 Update the TV software [3/3]

Note:

- Do not remove the USB flash drive during the software update.
- If a power failure occurs during the update, do not remove the USB flash drive from the TV. The TV will continue the software update as soon as the power comes up again.
- If an error occurs during the update retry the procedure or contact the dealer.
- We do not recommend downgrading to an older version.
- Once the upgrade is finished, use the PC to remove the TV software from the USB portable memory.

5.5.6 Content and Usage of the One-Zip Software File

Below you find a content explanation of the One-Zip file, and instructions on how and when to use it. Only files that are relevant for Service are mentioned here.

- **EDID_clustername.zip:** Contains the EDID content of the different EDID NVMs. See ComPair for further instructions.
- **FUS_clustername_version.zip:** Contains the "autorun.upg" which is needed to upgrade the TV main software and the software download application.
- **NVM_clustername_version.zip:** Default NVM content. Must be programmed via ComPair.

5.5.7 How to Copy NVM Data to/from USB

When copying data to and from a USB memory stick, the folder "repair" is used. When inserting an empty USB memory stick, and downloading data to the stick, the TV will create this folder. When sending data from a USB memory stick to a TV, the intended data must be available in the "repair" folder.
Note that when copying EDID data to the TV, all necessary EDID files must be in this folder.
Service mode overview for your reference

Table 5-3 Service mode overview

Service Modes	Description
SAM	Service alignment mode
Factory Mode	Used for extended alignments
SDM	Service default Mode
CSM	3 page compact CSM pages. There will be CSM dump to USB-stick upon entering CSM-mode
USB SW upgradeable	SW upgrading of flash memories MTK chips MT5366 can be done via USB. The main SW can be upgraded via Autorun.upg
NVM-Editor in SAM	NVM-editor will function as in the past. Address and Value field is a decimal value via digit entry
Service Data	New Service data in SAM for CTN, Prod. no., 12NC programming with virtual key board
USB copy/paste in SAM	Channel list, NVM data, Readable Info, EDID
UART logging	There will be printout available in UART. No specifications of the printout, per MTK provision/definition
Blind SAM	RC sequence "062598" + "Menu" + "Panel code"
Clear Buffer	RC sequence "062599" + "OK" or via SAM

5.6 Error Codes

5.6.1 Introduction

Error codes are required to indicate failures in the TV set. In principle a unique error code is available for every:

- Activated (SW) protection.
- Failing I^2C device.
- General I^2C error.

The last five errors, stored in the NVM, are shown in the Service menu's. This is called the error buffer.
The error code buffer contains all errors detected since the last time the buffer was erased. The buffer is written from left to right. When an error occurs that is not yet in the error code buffer, it is displayed at the left side and all other errors shift one position to the right.
An error will be added to the buffer if this error differs from any error in the buffer. The last found error is displayed on the left.
An error with a designated error code **never** leads to a deadlock situation. It must always be diagnosable (e.g. error buffer via OSD or blinking LED or via ComPair).
In case a failure identified by an error code automatically results in other error codes (cause and effect), only the error code of the MAIN failure is displayed.

5.6.2 How to Read the Error Buffer

You can read the error buffer in three ways.

- On screen via the SAM/SDM/CSM (if you have a picture). Example:
  - **ERROR: 000 000 000 000 000.** No errors detected
  - **ERROR: 013 000 000 000 000:** Error code 13 is the last and only detected error

- **ERROR: 034 013 000 000 000**: Error code 13 was detected first and error code 34 is the last detected (newest) error
- Via the blinking LED procedure (when you have no picture). See paragraph 5.7 The Blinking LED Procedure.
- Via ComPair.

5.6.3 Error codes

In this chassis only "layer 2" error codes are available and point to problems on the SSB. They are triggered by LED blinking when CSM is activated. Only the following layer 2 errors are defined:

Table 5-4 Error code table

Layer-2 error code	Defective device
13	General I^2C bus error on the SSB
16	+12 V missing or low, PSU defective
27	Channel decoder error on the SSB
34	Tuner I^2C bus error on the SSB
35	EEPROM I^2C error on SSB. M24C64

5.6.4 How to Clear the Error Buffer

The error code buffer is cleared in the following cases:
- By using the CLEAR command in the SAM menu
- By using the CLEAR command in the Factory mode
- By using the following key sequence on the remote control transmitter: "**062599**" directly followed by the **OK** button.
- If the contents of the error buffer have not changed for 50 hours, the error buffer resets automatically.

Note: If you exit SAM by disconnecting the mains from the television set, the error buffer is not reset.

5.7 The Blinking LED Procedure

5.7.1 Introduction

The software is capable of identifying different kinds of errors. Because it is possible that more than one error can occur over time, an error buffer is available, which is capable of storing the last five errors that occurred. This is useful if the OSD is not working properly.
Errors can also be displayed by the blinking LED procedure. The method is to repeatedly let the front LED pulse with as many pulses as the error code number, followed by a period of 1.5 seconds in which the LED is "off". Then this sequence is repeated.
Example (1): error code 4 will result in four times the sequence LED "on" for 0.25 seconds / LED "off" for 0.25 seconds. After this sequence, the LED will be "off" for 1.5 seconds. Any RC command terminates the sequence. Error code LED blinking is in red color.
Example (2): the content of the error buffer is "12 9 6 0 0" After entering SDM, the following occurs.
- 1 long blink of 5 seconds to start the sequence.
- 12 short blinks followed by a pause of 1.5 seconds.
- 9 short blinks followed by a pause of 1.5 seconds.
- 6 short blinks followed by a pause of 1.5 seconds.
- 1 long blink of 1.5 seconds to finish the sequence.
- The sequence starts again with 12 short blinks.

5.7.2 Displaying the Entire Error Buffer

Additionally, the entire error buffer is displayed when Service Mode "SDM" is entered.

5.8 Fault Finding and Repair Tips

Note:
- It is assumed that the components are mounted correctly with correct values and no bad solder joints.
- Before any fault finding actions, check if the correct options are set.

5.8.1 NVM Editor

In some cases, it can be convenient if one directly can change the NVM contents. This can be done with the "NVM Editor" in SAM mode. With this option, single bytes can be changed.

Caution:
- Do not change these, without understanding the function of each setting, because incorrect NVM settings may seriously hamper the correct functioning of the TV set!
- Always write down the existing NVM settings, before changing the settings. This will enable you to return to the original settings, if the new settings turn out to be incorrect.

5.8.2 Load Default NVM Values

It is possible to upload the default values to the NVM with ComPair in case the SW is changed, the NVM is replaced with a new (empty) one, or when the NVM content is corrupted. After replacing an EEPROM (or with a defective/no EEPROM), default settings should be used to enable the set to start-up and allow the Service Default Mode and Service Alignment Mode to be accessed.

5.8.3 No Picture

When you have no picture, first make sure you have entered the correct display code. See paragraph 6.4 Option Settings for the instructions. See also Table 6-3.

5.8.4 Unstable Picture via HDMI input

Check (via ComPair or factory mode) if HDMI EDID data is properly programmed.

5.8.5 No Picture via HDMI input

Check if HDCP key is valid. This can be done in CSM.

5.8.6 TV Will Not Start-up from Stand-by

Possible Stand-by Controller failure. Re-flash the software.

5.8.7 Audio Amplifier

The Class D-IC U6002 has a powerpad for cooling. When the IC is replaced it must be ensured that the powerpad is very well pushed to the PWB while the solder is still liquid. This is needed to insure that the cooling is guaranteed, otherwise the Class D-IC could break down in short time.

5.8.8 CSM

When CSM is activated and there is a USB memory stick connected to the TV, the software will dump the complete CSM content to the USB memory stick. The file (Csm.txt) will be saved in the root of the USB memory stick.

5.8.9 Loudspeakers

Make sure that the volume is set to minimum during disconnecting the speakers in the ON-state of the TV. The audio amplifier can be damaged by disconnecting the speakers during ON-state of the set!

5.8.10 Display option code

Attention: In case the SSB is replaced, always check the Panel Code in CSM, even when picture is available. Performance with the incorrect display option code can lead to unwanted side-effects for certain conditions.

6. Alignments

Index of this chapter:

6.1 General Alignment Conditions
6.2 Hardware Alignments
6.3 Software Alignments
6.4 Option Settings
6.5 Reset of Repaired SSB

6.1 General Alignment Conditions

Perform all electrical adjustments under the following conditions:

- Power supply voltage: 90 - 264 V_{AC}, 50/ 60 ± 3 Hz.
- Connect the set to the mains via an isolation transformer with low internal resistance.
- Allow the set to warm up for approximately 15 minutes.
- Measure voltages and waveforms in relation to correct ground (e.g. measure audio signals in relation to AUDIO_GND).
  Caution: It is not allowed to use heat sinks as ground.
- Test probe: R_i > 10 MΩ, C_i < 20 pF.
- Use an isolated trimmer/screwdriver to perform alignments.

6.2 Hardware Alignments

Not applicable.

6.3 Software Alignments

Put the set in SAM mode (see Chapter 5. Service Modes, Error Codes, and Fault Finding). The SAM menu will now appear on the screen. Select RGB Align and go to one of the sub menus. The alignments are explained below.
The following items can be aligned:

- White point.

To store the data:

- Press OK on the RC **before the cursor is moved to the left.**
- Select "Store" and press OK on the RC.
- Switch the set to stand-by mode.

For the next alignments, supply the following test signals via a video generator to the RF input:

- **EU/AP-PAL models**: a PAL B/G TV-signal with a signal strength of at least 1 mV and a frequency of 475.25 MHz
- **US/AP-NTSC models**: an NTSC M/N TV-signal with a signal strength of at least 1 mV and a frequency of 61.25 MHz (channel 3).
- **LATAM models:** an NTSC M TV-signal with a signal strength of at least 1 mV and a frequency of 61.25 MHz (channel 3).

6.3.1 RGB Alignment

Before alignment, set the picture as follows:

Picture Setting	
Dynamic backlight	Off
Dynamic Contrast	Off
Color Enhancement	Off
Picture Format	Unscaled
Light Sensor	Off
Brightness	50
Color	0
Contrast	100

White Tone Alignment:

- Activate SAM.
- Select "RGB Align." and choose a color temperature.
- Use a 100% white screen as input signal and set the following values:
  - "Red BL Offset" and "Green BL Offset" to "7" (If present).
  - All "White point" values initial to "128".

In case you have a colour analyser:

- Measure with a calibrated (phosphor- independent) color analyser (e.g. Minolta CA-210) in the centre of the screen. Consequently, the measurement needs to be done in a dark environment.
- Adjust the correct x, y coordinates (while holding one of the White point registers R, G or B on max. value) by means of decreasing the value of one or two other white points to the correct x, y coordinates (see Table 6-1 White D alignment values). Tolerance. dx: ± 0.003, dy: ± 0.003.
- Repeat this step for the other colour Temperatures that need to be aligned.
- When finished return to the SAM root menu and press STANDBY on the RC to store the aligned values to the NVM.

Table 6-1 White D alignment values

Value	Cool (12000 K)	Normal (9000 K)	Warm (6500 K)
x	0.276	0.287	0.313
y	0.282	0.296	0.329

If you do **not** have a colour analyser, you can use the default values. This is the next best solution. The default values are average values coming from production (statistics).

6.3.2 Display Adjustment

You can use the default values. The default values are average values coming from production.

- Enter SAM mode.
- Select a colour temperature (e.g. COOL, NORMAL, or WARM).
- Set the RED, GREEN and BLUE default values according to the values in Table 6-2.
- When finished press OK on the RC, then press STORE to store the aligned values to the NVM.
- Restore the initial picture settings after the alignments.

Table 6-2 White tone default settings

Picture mode	Screen size	Colour temperature		
		Red	Green	Blue
Normal (9000K)	19HFL3007D	98	96	128
	22HFL3007D	61	76	128
	22HFL3017D	98	107	128
	22HFL3017W	98	107	128
Cool (11000K)	19HFL3007D	82	83	128
	22HFL3007D	44	63	128
	22HFL3017D	86	97	128
	22HFL3017W	86	97	128
Warm (6500K)	19HFL3007D	128	115	124
	22HFL3007D	115	117	128
	22HFL3017D	128	128	124
	22HFL3017W	128	128	124

This group setting of colour temperature will be applied automatically to the TV / VGA / HDMI / AV sources.

6.4 Option Settings

6.4.1 Introduction

The microprocessor communicates with a large number of I^2C ICs in the set. To ensure good communication and to make digital diagnosis possible, the microprocessor has to know which ICs to address. The presence / absence of these MT5366 ICs is made known by the option codes.

Notes:

- After changing the option(s), save them by pressing the OK button on the RC before the cursor is moved to the left, select STORE and press OK on the RC.
- The new option setting is only active after the TV is switched "off" / "stand-by" and "on" again with the mains switch (the NVM is then read again).

6.4.2 Option Code Overview

Enter SAM mode to check the option codes. they could not be edited in the NVM.

6.4.3 Display Code Overview

Press the following key sequence on a standard RC transmitter: "062598" directly followed by MENU and "xxx", where "xxx" is a 3 digit decimal value of the panel type. see column "Display Code" in Table 6-3. After resetting the Display Code, restart the set immediately

Table 6-3 Display code overview

CTN_ALT BOM#	Panel Type	Display Code
19HFL3007D	LC185EXE TEA1	159
22HFL3007D	TPM215HW01-HGEL02	171
22HFL3017D	LC215EUE-TEA1	160
22HFL3017W	LC215EUE-TEA1	160

6.5 Reset of Repaired SSB

A very important issue towards a repaired SSB from a Service repair shop (SSB repair on component level) implies the reset of the NVM on the SSB.
A repaired SSB in Service should get the service Set type "00PF0000000000" and Production code "00000000000000". Also the virgin bit is to be set. To set all this, you can use the ComPair tool or use the "NVM editor" and "Dealer options" items in SAM (do not forget to "store").

After a repaired SSB has been mounted in the set (set repair on board level), the type number (CTN) and production code of the TV has to be set according to the type plate of the set. For this, you can use the NVM editor in SAM. The loading of the CTN and production code can also be done via ComPair (Model number programming).

In case of a display replacement, reset the "Operation hours display" to "0", or to the operation hours of the replacement display.

6.5.1 SSB Identification

SSB's of this chassis are identified by a "715" code on the SSB.
715Axxxx-Nnn-MMM-OOOO

- **715** main category, Printed Wiring Board
- **Axxxx** sub category, sequential coding number
- **Nnn** Version code
  - **N** Development number
  - nn Production number
- **MMM** Mounting variation code
- **OOOO** Optional variation code

Make sure when replacing an SSB the SSB identification codes match the replacement board.

7. Circuit Descriptions

Index of this chapter:

7.1 Introduction
7.2 Power Supply
7.3 DC/DC Converters
7.4 Front-End Analogue and DVB-T, DVB-C, ISDB-T reception
7.5 HDMI
7.6 Video and Audio Processing - MT5366IVGG/B

Notes:

- Only **new** circuits (circuits that are not published recently) are described.
- Figures can deviate slightly from the actual situation, due to different set executions.
- For a good understanding of the following circuit descriptions, please use the wiring, block (see chapter 9. Block Diagrams) and circuit diagrams (see chapter 10. Circuit Diagrams and PWB Layouts). Where necessary, you will find a separate drawing for clarification.

7.1 Introduction

The TPM9.3HE LA is a new chassis launched in Europe in 2012 for institutional purposes. The whole range is covered by MT5366IVGG/B PBGA-479 main IC so-called MT5366 platform. Throughout this chassis LED displays are used.

7.1.1 Implementation

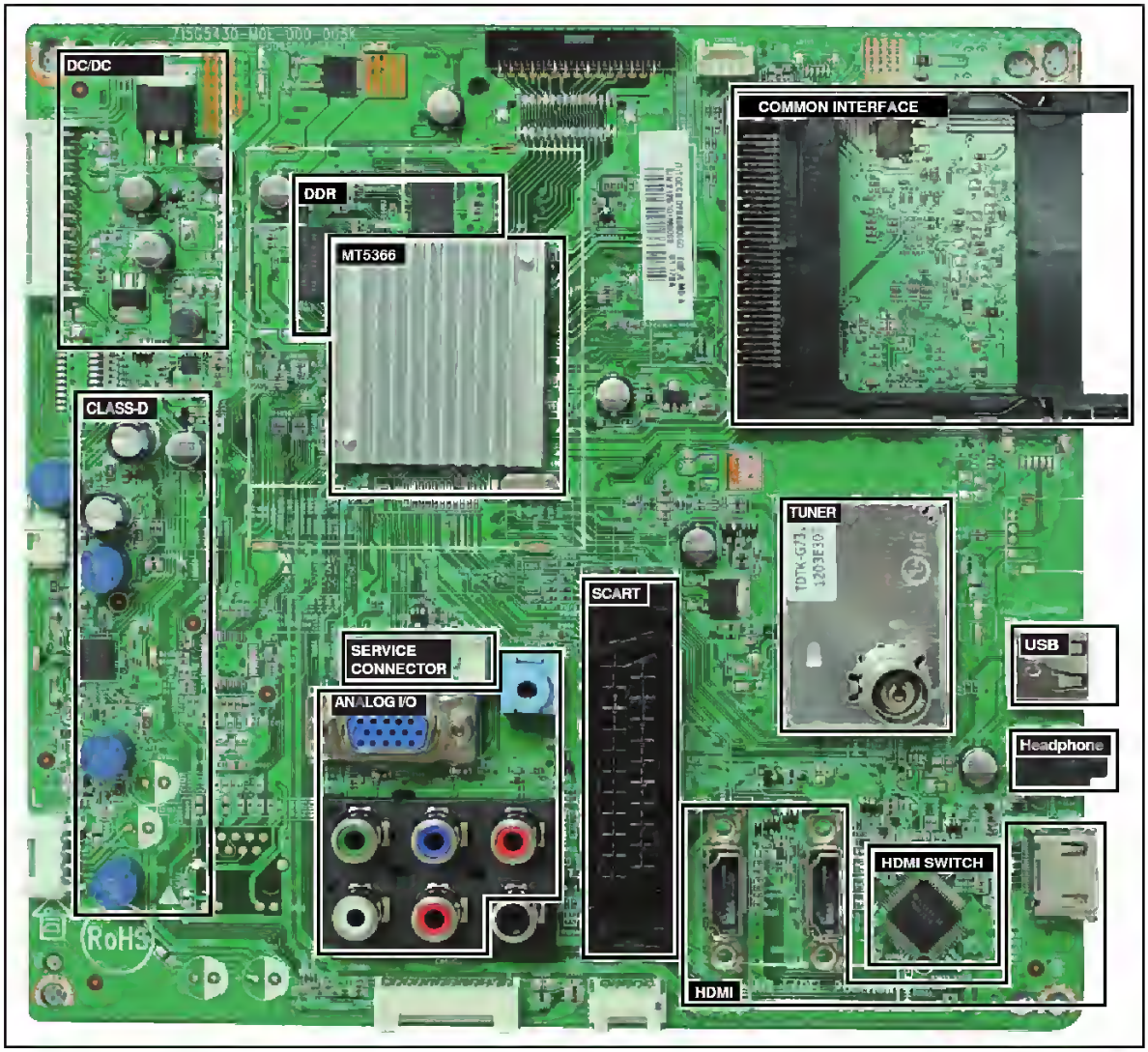
Key components of this chassis are:

- MT5366IVGG/B PBGA-479 TV Processor
- TDTK-G731D Europa tuner for D series
- TMDS361BPAGR TQFP-64 HDMI Switch
- STA381BWTR 20 Watt VQFN-AUDIO Amplifier

7.1.2 TPM9.3HE LA Architecture Overview

An overview of the TPM9.3HE LA architecture can be found in 9.4 Block Diagram

7.1.3 SSB Cell Layout



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120925

Figure 7-1 SSB layout cells (top view)

7.2 Power Supply

Refer to figure Figure 7-2 for the power architecture of this platform.

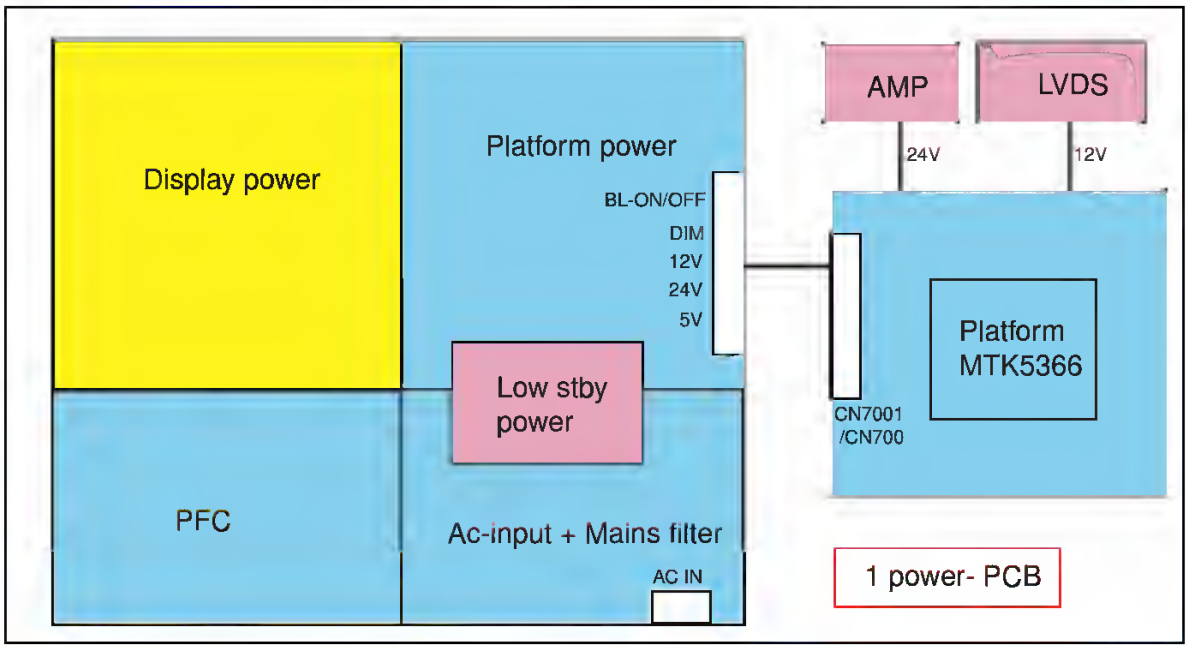

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Figure 7-2 Power Architecture xxHFL30xxx/10

7.2.1 Power Supply Unit

All power supplies are a black box for Service. When defective, a new board must be ordered and the defective one must be returned, unless the main fuse of the board is broken. Always replace a defective fuse with one with the correct specifications! This part is available in the regular market. Consult the Philips Service web portal for the order codes of the boards.

Important delta's with the xxHFL30xxx/10platform are:
- New power architecture for LED backlight
- "Boost"-signal is now a PWM-signal + continuous variable.

The control signals are:
- Stand-by
- Lamp "on/off"
- DIM (PWM) (not for PSDL)

In this manual, no detailed information is available because of design protection issues.

The output voltages to the chassis are:
- +5V-STANDBY (Stand-by mode only)
- +12V (on-mode)
- +Vsnd (+24V) (audio power) (on-mode)
- +24V (bolt-on power) (on-mode)
- Output to the display; in case of
  - PSL and PSLS (LED-driver outputs)
  - PSDL (high frequent) AC-current.

7.2.2 Diversity

The diversity in power supply units is mainly determined by the diversity in displays.

The following displays can be distinguished:

- LED backlight:
  - side-view LED without scanning: PSL power board
  - side-view LED with scanning: PSLS power board
  - direct-view LED without 2D-dimming: PSL power board
  - direct-view LED with 2D-dimming: PSDL power board.

PSL stands for **P**ower **S**upply with integrated **L**ED-drivers
PSLS stands for a **P**ower **S**upply with integrated **L**ED-drivers with added **S**canning functionality (added microcontroller).
PSDL stands for a **P**ower **S**upply for **D**irect-view **L**ED backlight with 2D-dimming.

7.2.3 Connector overview

Table 7-1 Connector overview

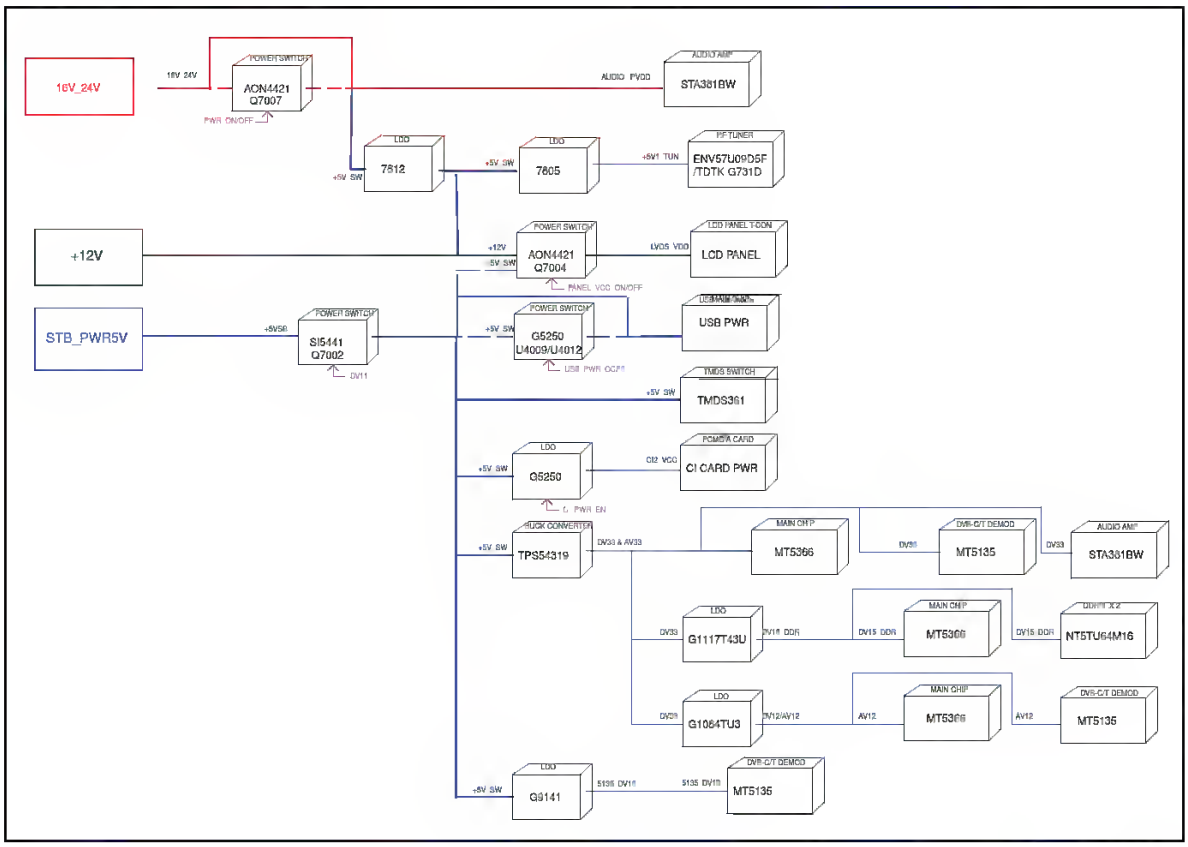
	Connector			
	xxHFL3007D/10		22HFL3017	
no.	CN6101	CN9101	CN6101	CN9101
Descr.	to panel	to SSB	to panel	to SSB
Pin	CN6101	CN9101	CN6101	CN9101
1	LED1	NC	LED1	NC
2	LED2	+5.2V	LED2	+5.2V
3	VLED+	+5.2V	VLED+	+5.2V
4	LED3	NC	LED3	NC
5	LED4	+16 V	LED4	+16 V
6	-	+16 V	-	+16V
7	-	GND	-	GND
8	-	GND	-	GND
9	-	GND	-	GND
10	-	NC	-	NC
11	-	NC	-	NC
12	-	DIM	-	DIM
13	-	ON/OFF	-	ON/OFF

7.3 DC/DC Converters

The on-board DC/DC converters deliver the following voltages (depending on set execution):

- +5V2-STANDBY, permanent voltage for the Stand-by controller, LED/IR receiver and controls;
- +12V, input from the power supply for the panel common (active mode);
- +24V, input from the power supply for the amplifier;
- +1V1, core voltage supply for MTK5366, has to be started up firsf and switched "off" last
- +1V2, from the power supply for the scaler IC MT5366
- +1V5, supply voltage for DDR3 (diagram B)
- +3V3, general supply voltage
- +5V-TUN, supply voltage for tuner
- +5V-USB, inpuf Intermediate supply voltage for USB Power
- +3V3 from the power supply for the scaler IC MT5366

See figure 7-3 DC/DC converters for a detailed sefup of the DC/DC converters.



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120925

Figure 7-3 DC/DC converters

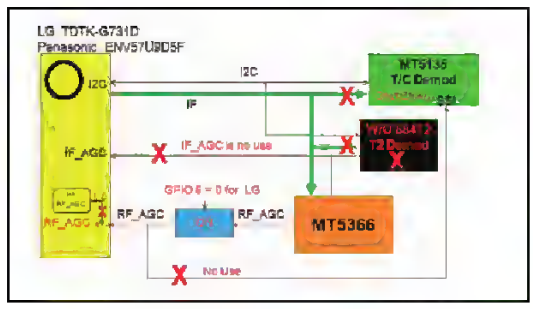
7.4 Front-End Analogue and DVB-T, DVB-C, ISDB-T reception

7.4.1 Front-End Analogue part

The Front-End for the analogue tuner consisf of the following key components:

- ENV57U09D5F
- MT5366IVGG/B PBGA-479

Below find a block diagram of the front-end application for analogue.



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120224

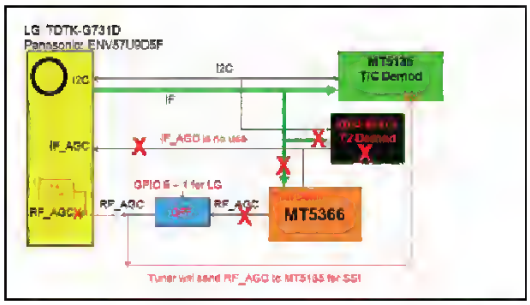
Figure 7-4 Front-End analogue block diagram

7.4.2 DVB-T/C DTV

The Front-End for DVB-T/C DTV consist of the following key components:

- ENV57U09D5F
- MT5366IVGG/B PBGA-479
- Demodulator MT5135AE/A LOFP-128

Below find a block diagram of the front-end application for DVB-T/C DTV.



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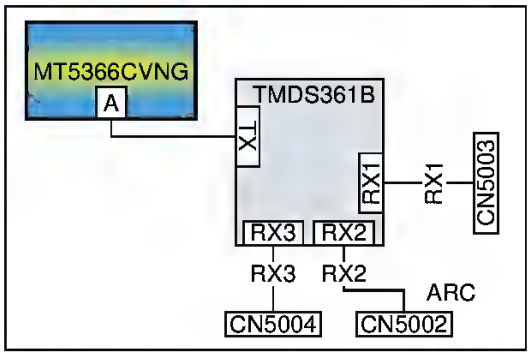
120224

Figure 7-5 Front-End DVB-T/C DTV block diagram

7.5 HDMI

In this platform, the Silicon Image TMDS361B HDMI multiplexer is implemented. Refer to figure 7-6 HDMI input configuration for the application.



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120501

Figure 7-6 HDMI input configuration

The hardware default I^2C addresses are.
- TMDS361B: 0xB0/0xB2 (random: software workaround)
- TMDS361B: 0xB2 (fixed).

The TMDS361B has the following specifications:
- +5V detection mechanism
- Stable clock detection mechanism
- Integrated EDID
- RT control
- HPD control
- Sync detection
- TMDS output control
- CEC control

7.6 Video and Audio Processing - MT5366IVGG/B

The MTK5366IVGG is the main audio and video processor (or System-on-Chip) for this platform.

It has the following features:
- Multi-standard digital video decoder (MPEG-2, H.264, MPEG-4)
- Integrated DVB-T/DVB-C channel decoder
- Integrated CI+
- Integrated motion accurate picture processing
- High definition ME/MC
- 2D LED backlight dimming option
- Embeded HDMI HDCP keys
- Extended colour gamut and colour booster
- Integrated USB2.0 host controller
- Improved MPEG artefact reduction compared
- Securnty for customers own code/settings (secure flash).

The MTK5366IVGG combines front-end video processing functions, such as DVB-T channel decoding, MPEG-2/H.264 decoding, analog video decode and HDMI reception, with advanced back-end video picture improvements. It also includes next generation Motion Accurate Picture Processing. High flat panel screen resolutions and refresh rates are supported with formats including 1366 × 768 @ 60Hz and 1920 × 1080 @ 60Hz. The combination of Ethernet, CI+ and H.264 supports new TV experiences with IPTV and VOD. On top of that, optional support is available for 2D dimming in combination with LED backlights for optimum contrast and power savings up to 50%.

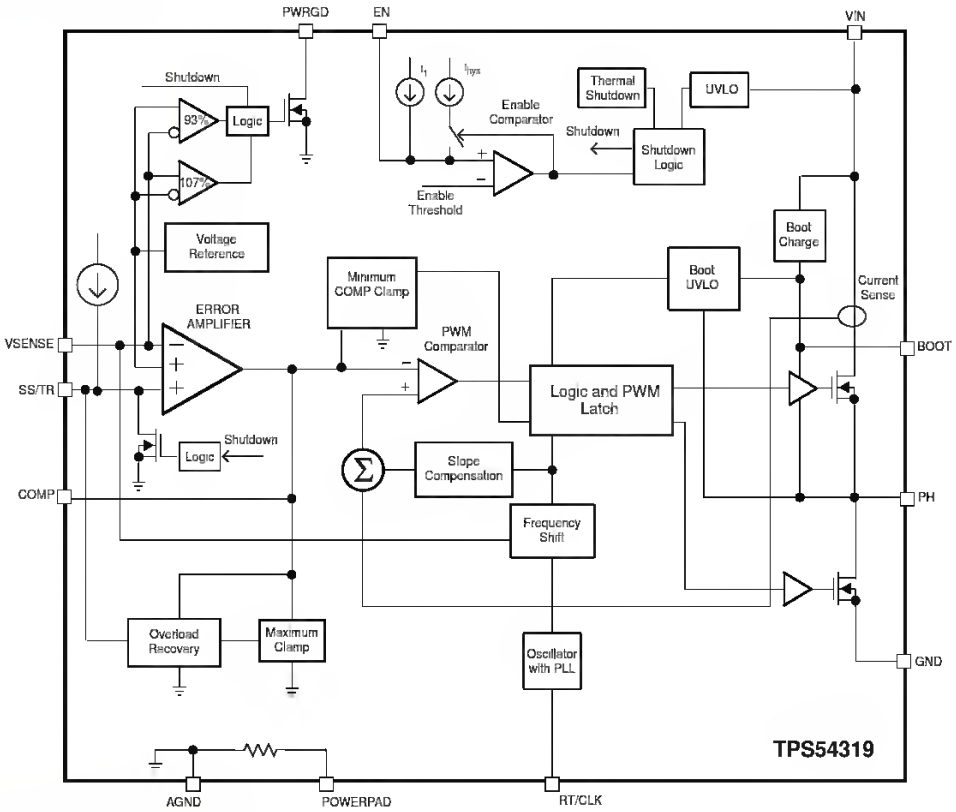
For a functional diagram of the MTK5366IVGG, refer to Figure 8-2.

8. IC Data Sheets

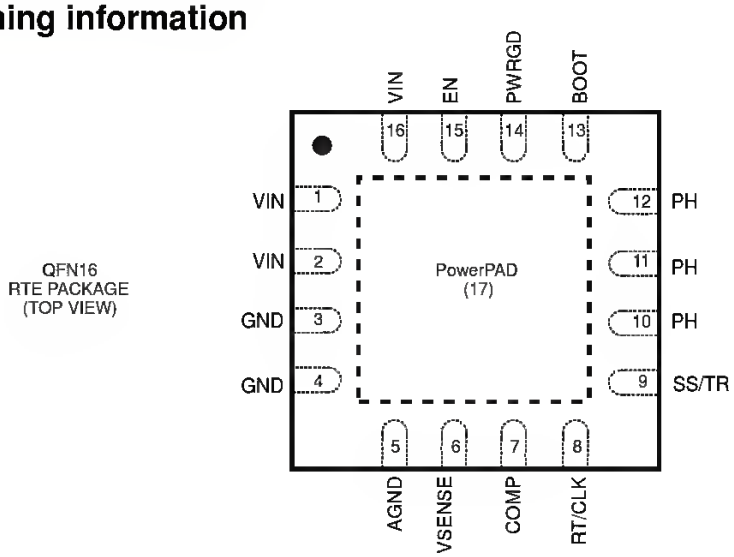
This chapter shows the internal block diagrams and pin configurations of ICs that are drawn as "black boxes" in the electrical diagrams (with the exception of "memory" and "logic" ICs).

8.1 Diagram 10-2-1 System Power 1 B01, TPS54319RTE (IC U7004)

Block diagram



Pinning information



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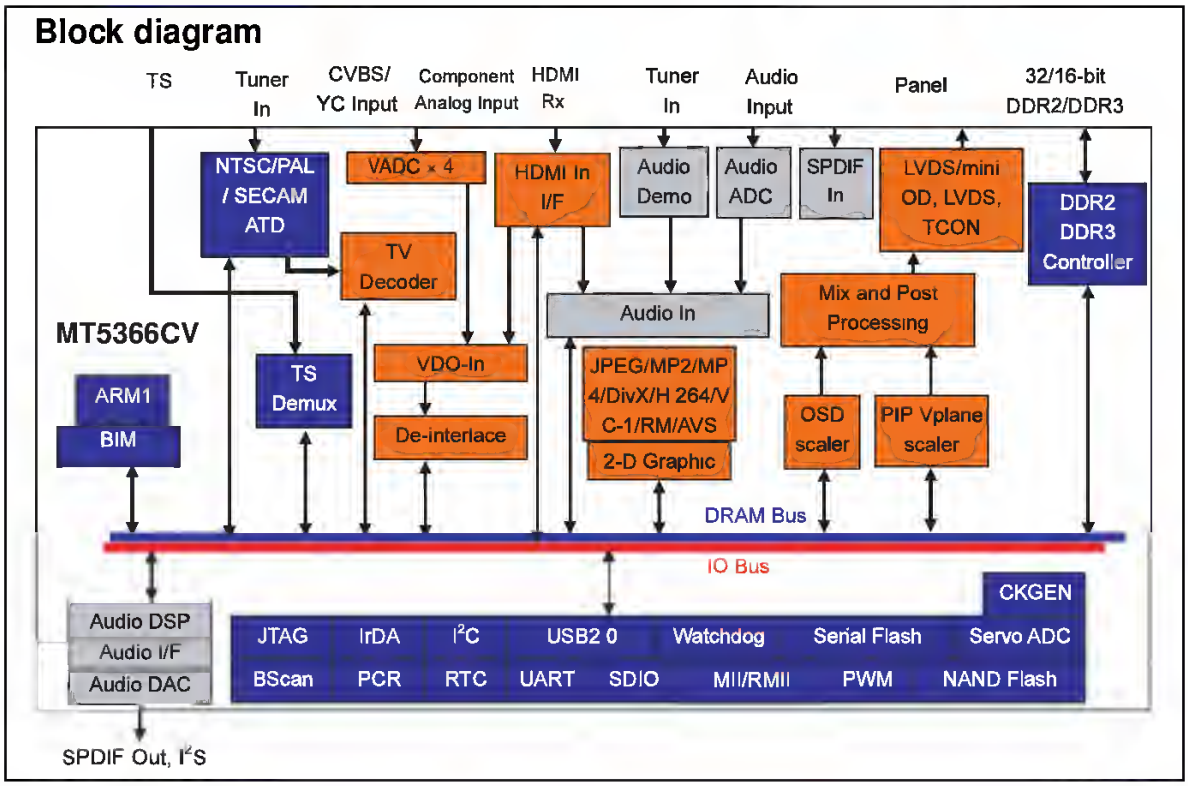
120102

Figure 8-1 Internal block diagram and pin configuration

8.2 Diagram 10-2-3 Peripheral B03, MT5366IVGG/B PBGA-479 (IC U4001)



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120102

Figure 8-2 Internal block diagram

Pinning information MT5366CV [1/2]

479	1	2	3	4	5	6	7	8	9	10	11	12
A	VCC2ID	RCS_//RRAS_	RDDT//RODT	RWE_//RCS_		RA10//RA7	RA5//RA3		RCLK0//RCLK0	RDO10//RDD10		RDQS1//RDDS1
B	VCC2ID	VCC2ID	RRAS_//RCAS_	RCKE//RWE_		RA1//RA13	RA3//RA9		RCLK0_//RCLK0_	RDD13//RDO8		RDDS1_//RDQS1_
C	RDO28//RDD27	VCC2ID	VCC2ID	RCAS_//RA0	RBA0//RA2	RBA2//RRESET_	RA7//RBA2	MEMTN	DVSS	RDO8//RDD14	RDQ15//RDD12	RDOM0//RDDM0
D	RDD25//RDQ29	RDD27//RDO25	VCC2ID	VCC2ID	RBA1//RA5	RA0//RA12	RA13//RA6	MEMTP	RA9//RCKE		RDD7//RDQ3	RDD0//RDQ1
E	RDOM3//RDOM3	RDO30//RDO31	RVREF	VCC2IO	VCC2IO	NC//RA8	RA8//RBA0	RA12//RA10	RA2//RBA1	DVSS	RDO2//RDO7	RDO5//RDO5
F	RDQS2_//RDDS2_	RDOS2//RDDS2			VCC2ID	VCC2ID	RA11//RA11	RA4//RA4	RA6//RA1	DVSS	DVSS	DVSS
G	RDOS3//RDQS3	RDQS3_//RDOS3_	RDOM2//RDQM2	RDQ19//RDO22	RDQ22//RDO16	VCC2IO						
H			RDQ31//RDO28	RDQ20//RDD20	RDQ17//RDO18	DVSS		VCC2ID	AVDD12_MEMPLL	AVSS12_MEMPLL	DVSS	DVSS
J	RDQ26//RDQ24	RDQ29//RDQ26	RDQ24//RDQ30	RDQ16//RDQ19	RDQ23//RDQ17	DVSS		VCC2IO				
K	RCLK1//RCLK1	RCLK1_//RCLK1_	RDQ18//RDQ23	RDQ21//RDQ21		DVSS	DVSS	VCC2IO	VCCK	VCCK	VCCK	DVSS
L			DVSS	DVSS	DVSS	DVSS			VCCK	VCCK	VCCK	DVSS
M	VCCK	VCCK	VCCK	VCCK	VCCK	VCCK			DVSS	DVSS	DVSS	DVSS
N	VCCK	VCCK	VCCK	VCCK	VCCK	VCCK			DVSS	DVSS	DVSS	DVSS
R	GPIO22	GPIO21	GPIO20	GPIO19	GPIO19	GPIO19			DVSS	DVSS	DVSS	DVSS
R			JTDO	JTCK	GPIO23	GPIO17	OPWM0		VCCK	DVSS	DVSS	DVSS
T	JTDI	JTRST_	JTMS		OPWM1	OPWM2		VCC3IO	VCCK	VCCK	VCCK	VCCK
U	U1TX	U1RX	OSCL1	OSDA1	GPIO24	GPIO25	GPIO27	VCC3IO				
V			ETRXD1	ETRXD0	ETMDIO	GPIO26	AVSS33_USB_2P	VCC3IO				
W	ETRXCLK	ETTXCLK	ETRXD3	ETRXD2	ETTXEN	ETMDC		AVSS33_VGA_STB	ADIN3_SRV	ADIN4_SRV	VSYNC	HSYNC
Y	ETTXD0	ETTXD1	ETTXD2	ETRXDV	ETTXD3		DPCTRL5	DRESET_		ADIN2_SRV	ADIN5_SRV	VDAC_DUT2
AA			ETCDL	ETPHYCLK		AVDD12_HDMI	AVDD33_VGA_STB	DPCTRL2	ADIN0_SRV		ADIN1_SRV	AVDD10_LDD
AB	AVDD33_USB_2P	USB_2P_DP0			HDMI_SDA	HDMI_CEC	OPCTRL4	U0TX	OPWRSB	COM	SOY1	VGA_SCL
AC	USB_2P_DM0	USB_2P_DP1	USB_2P_VRT	AVSS33_HDMI	HDMI_SCL	HDMI_HPD	U0RX	DIRI	GP	RP	VGA_SDA	SDY0
AD	USB_2P_DM1	RX_CB	RX_0B	RX_1B	RX_2B	PWR5V		OPCTRL0	BP		Y1P	PB1P
AE	AVDD33_HDMI	RX_C	RX_0	RX_1	RX_2	DPCTRL3		DPCTRL1	SDG		CDM1	PR1P
LB	1	2	3	4	5	6	7	8	9	10	11	12

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Figure 8-3 Pin configuration [1/2]

Pinning information MT5366CV [2/2]

13	14	15	16	17	18	19	20	21	22	23	24	25	RT
RDQS0_/ /RDQS0_		RDQ12// RDQ11	VCC2IO	AO0P	AO1P	AO2P	AOCKP	AO3P	AO4P	AO5P	TP_VPLL	DVSS	A
RDOS0// RDOS0		RDQ11// RDO9	VCC2IO	AO0N	AO1N	AO2N	AOCKN	AO3N	AO4N	AO5N		DVSS	B
RDOM1// RDOM1	RDO14// RDQ15	RDO9//R DQ13	VCC2IO	AE0N		AE1P	AE2N	AECKP		AE3N	AE4P	AE5N	C
RDQ6//R DO0	RDQ4//R DO4	VCC2IO		AE0P		AE1N	AE2P	AECKN		AE3P	AE4N	AE5P	D
RDO1//R DO2	RDO3//R DO6	VCC2IO	AVSS33_ LVDSA	AVSS33_ LVDSA	AVDD33_ LVDSA	AVDD33_ LVDSA			GPIO9	FSRC_W R	GPIO5	GPIO0	E
	VCC2IO	VCC2IO				AVDD12_ VPLL		GPIO11	GPIO10	GPIO2			F
						AVSS12_ VPLL	GPIO12	GPIO7	GPIO15	GPIO4	GPIO1	GPIO14	G
VCC2IO	VCC2IO					VCC3IO	GPIO6	GPIO8			GPIO13	GPIO3	H
						POWE_	PARB_	POCE0_	OSDA0	OSCL0	PACLE	PAALE	J
DVSS	DVSS	VCCK	VCCK	DVSS		PDD2	PDD3	POOE_	POCE1_	PDD7			K
DVSS	DVSS	VCCK	VCCK	DVSS					PDD1	PDD6	PDD5	PDD4	L
DVSS	DVSS	DVSS	DVSS		VCC3IO	PVR_TS DATA0	PVR_TS SYNC	PVR_TS VAL	SPI_DAT A	PDD0	CI_INT	SPI_CLE	M
DVSS	DVSS	DVSS	DVSS	DVSS	VCC3IO	DEMOD_ TSDATA 0	CI_TSVA L	SPI_CLK	PVR_TS DATA1				N
DVSS	DVSS	DVSS	DVSS	DVSS				CI_TSSY NC	PVR_TS CLK	RF_AGC	CI_TSDA TA0	CI_TSCL K	P
DVSS	DVSS	VCCK	VCCK	VCCK		IF_AGC	AOSDAT A3	AOSDAT A4	DEMOD_ TSSYNC	DEMOD_ RST	DEMOD_ TSVAL	DEMOD_ TSCLK	P
VCCK	VCCK	VCCK	VCCK	VCCK		AOSDAT A2	AOSDAT A4	AOBCK	OSDA2	OSCL2			T
										AOSDAT A4	AOLRCK	AOMCLK	U
						DVSS	ASPDIF	ALIN	AVDD33_ DAC	AVDD33_ DAC1	AR2_AD AC	AR3_AD AC	V
VDAC_O UT1	AVDD33_ CVBS	AVSS33_ VDAC	AVSS33_ CVBS	DVSS		DVSS	DVSS	DVSS	AVSS33_ DAC1	AR1_AD AC			W
	AVSS12_ RGB	CVBS_C OM	AVSS12_ DEMOD		AVSS33_ DEMOD	DVSS	DVSS	DVSS	DVSS	AR0_AD AC	AL3_ADA C	AL2_ADA C	Y
	AVDD33_ VDAC	FS_VDA C		AVSS12_ PLL	VMID_AA DC	AVDD33_ AADC	DVSS	AVSS33_ AADC	AVSS33_ DAC	DVSS	AL1_ADA C	AL0_ADA C	AA
Y0P	PB0P	AVDD12_ PLL	SY1	CVBS0P	AVDD12_ DEMOD	AVDD33_ IFPGA	AIN3_L_ AADC	AIN0_L_ AADC	DVSS	DVSS	DVSS	DVSS	AB
COM0	PR0P	SC1	CVBS2P	CVBS1P	AVDD33_ XTAL_ST B	AVDD33_ DEMOD	AIN5_L_ AADC	AIN4_L_ AADC	AIN6_L_ AADC	DVSS	DVSS	AIN2_R_ AADC	AC
	AVDD12_ RGB	SC0		ADCINP_ DEMOD		XTALO	LOUTN		AIN2_L_ AADC	AIN3_R_ AADC	AIN6_R_ AADC	AIN1_R_ AADC	AD
		SY0		ADCINN_ DEMOD	AVSS33_ XTAL_ST B	XTALI	LOUTP		AIN1_L_ AADC	AIN5_R_ AADC	AIN4_R_ AADC	AIN0_R_ AADC	AE
13	14	15	16	17	18	19	20	21	22	23	24	25	RB

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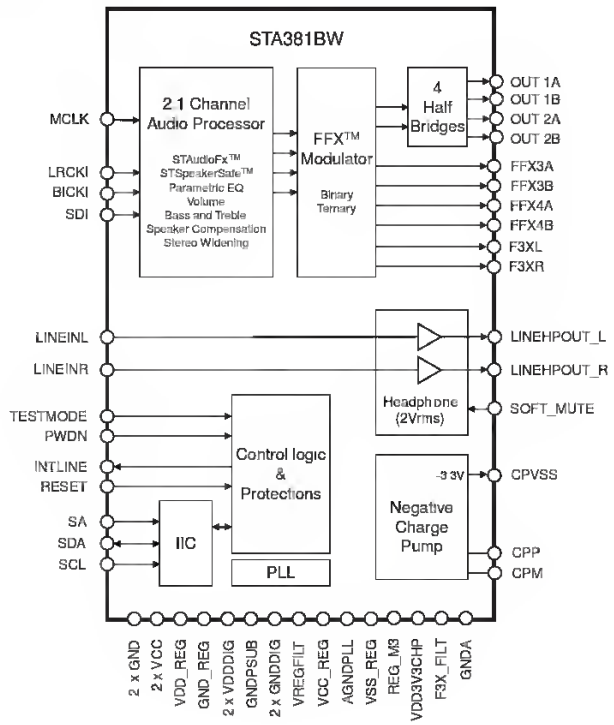
120102

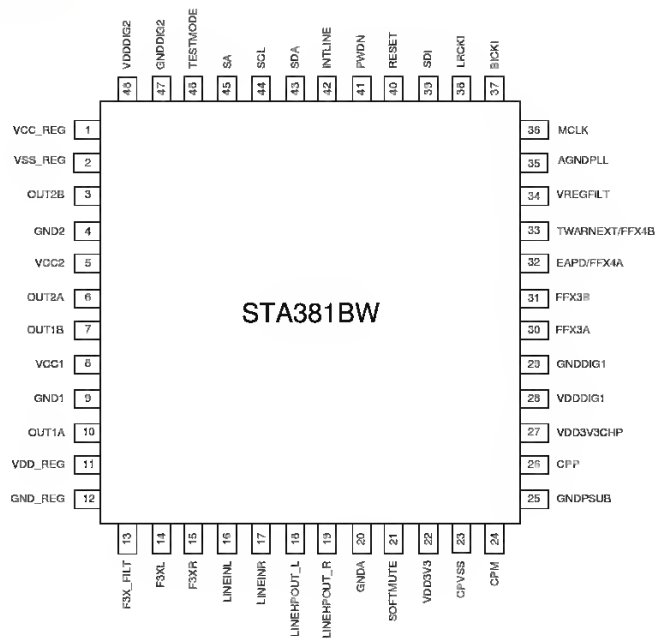
Figure 8-4 Pin configuration [2/2]

8.3 Diagram 10-2-6 Speaker B06, STA381BWTR (IC U6002)

Block diagram



Pinning information



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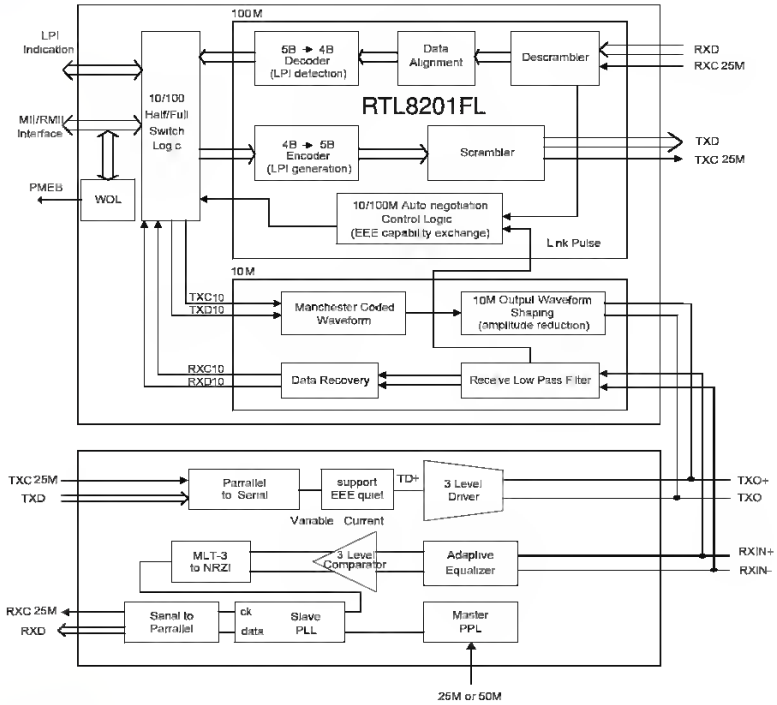
120224

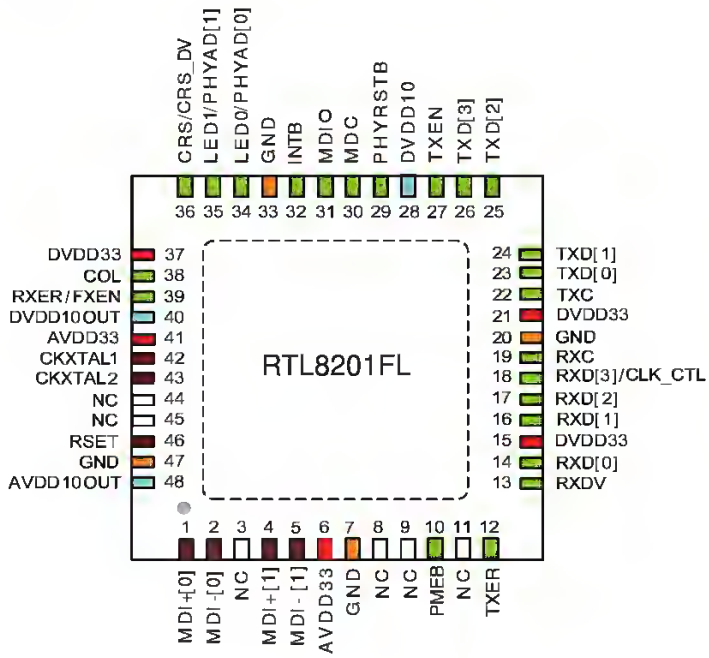
Figure 8-5 Internal block diagram and pin configuration

8.4 Diagram 10-2-12 GPIO & RJ45 B12, RTL8201FL-VB-CG (IC U4010)

Block diagram



Pinning information

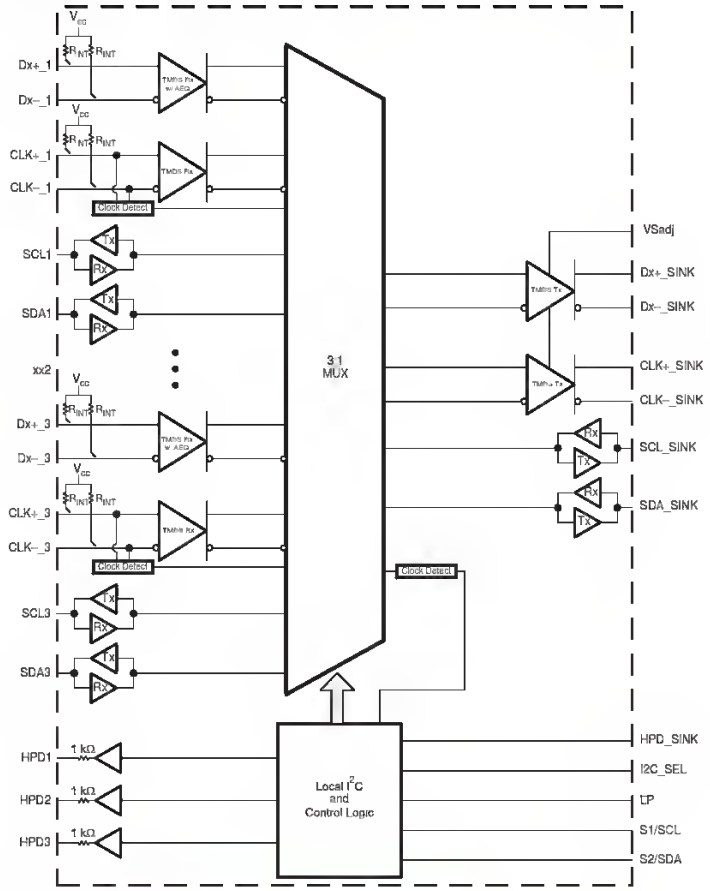


19240_302_120221.eps
120221

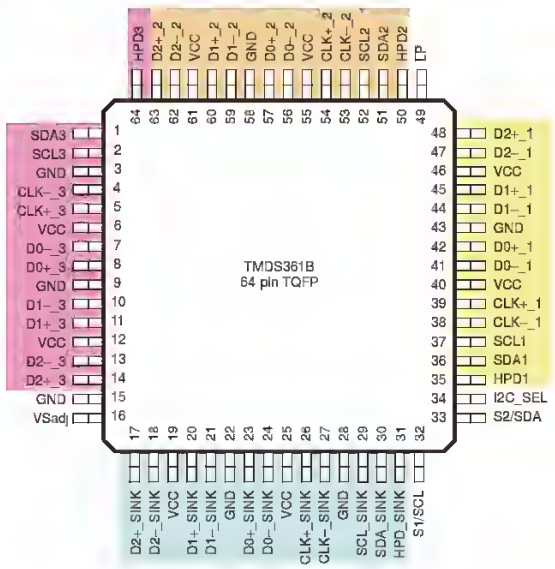
Figure 8-6 Internal block diagram and pin configuration

8.5 Diagram 10-2-13 HDMI Switch & Connector B13, TMDS361BPAGR (IC U5003)

Block diagram



Pinning information

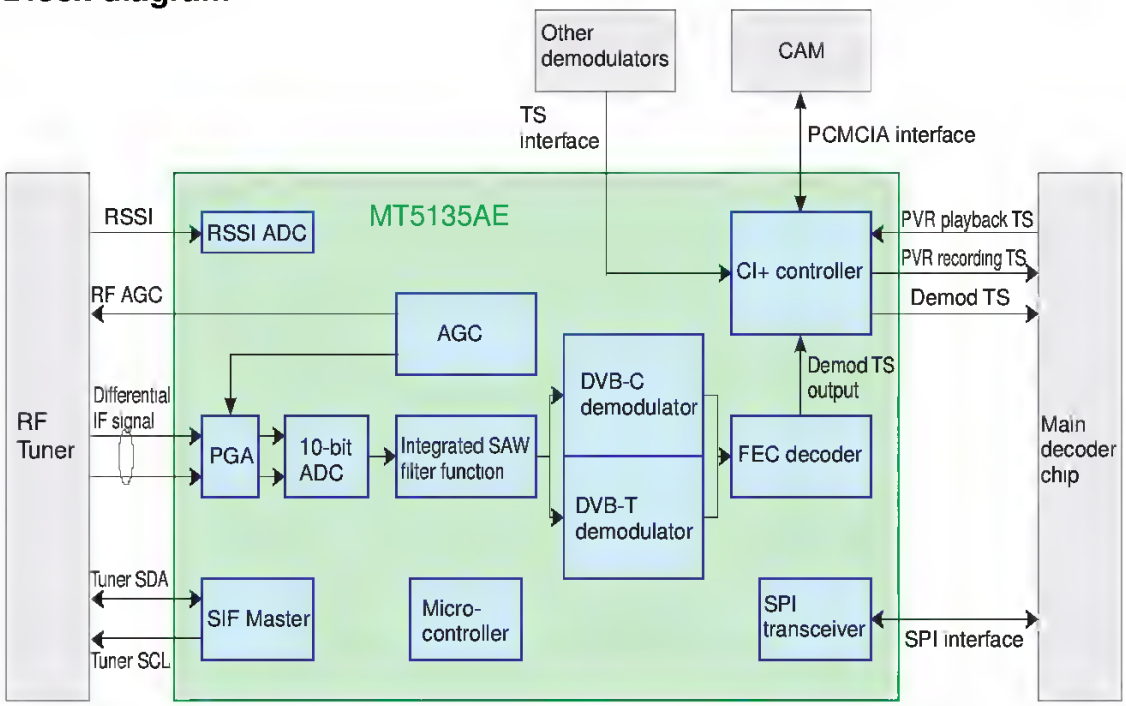


19160_304_110622.eps
110622

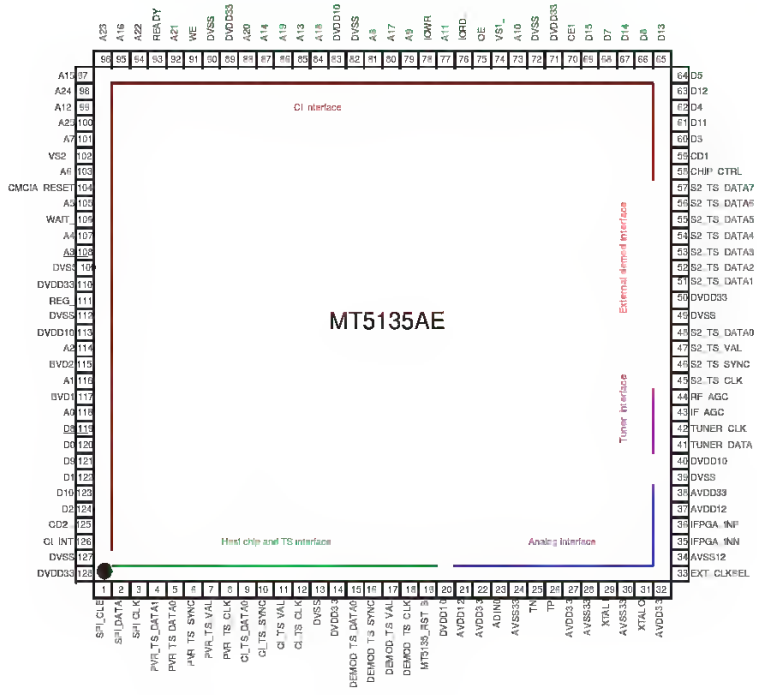
Figure 8-7 Internal block diagram and pin configuration

8.6 Diagram 10-2-15 Tuner B15, MT5135AE (IC U1005)

Block diagram



Pinning information

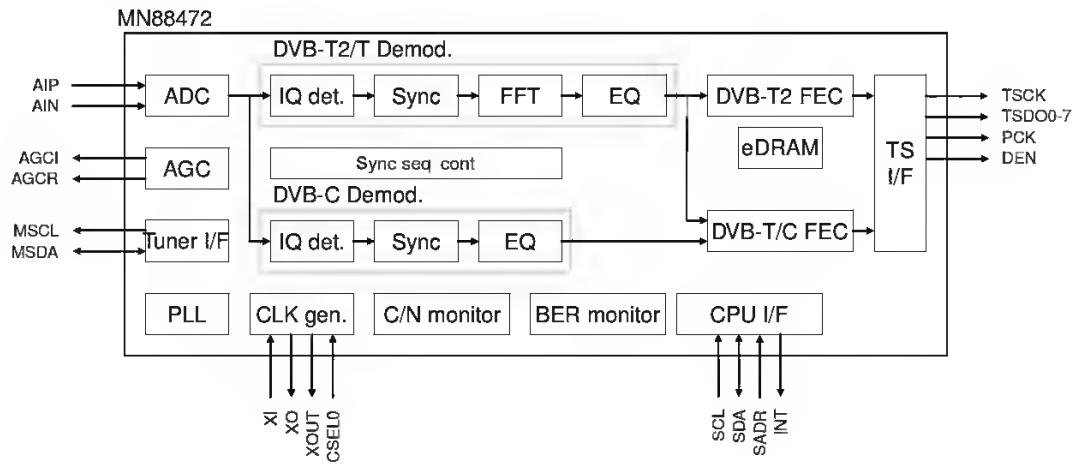


19080_303_110317.eps
110330

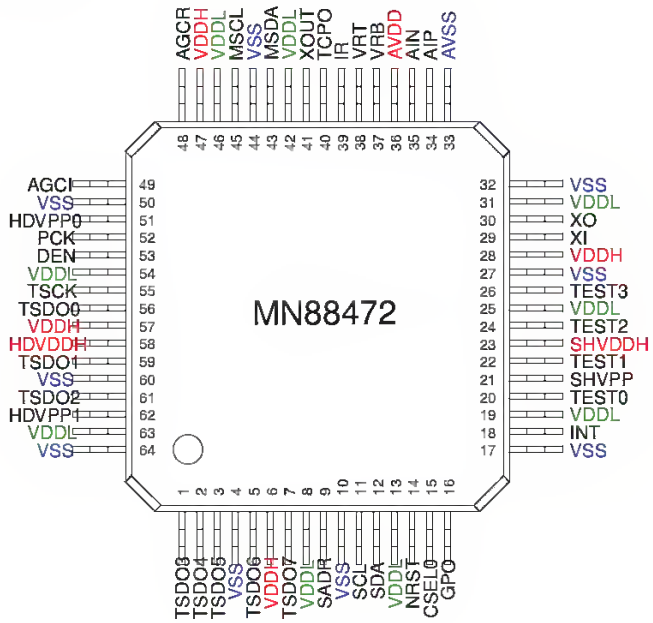
Figure 8-8 Internal block diagram and pin configuration

8.7 Diagram 10-2-16 DVB T2 Demodulator MN88472 B16, MN88472 (IC U1003)

Block diagram



Pinning information



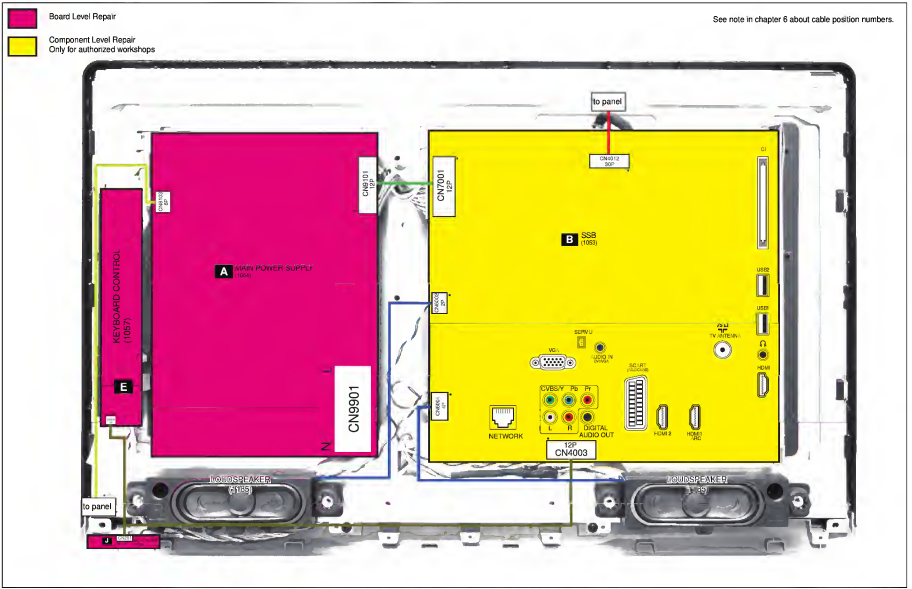
19270_300_120410.eps
120410

Figure 8-9 Internal block diagram and pin configuration

9. Block Diagrams

9.1 **Wiring diagram 19" S35 series**

WIRING DIAGRAM 19" (S35 series)



19270_400_120401.eps
120326

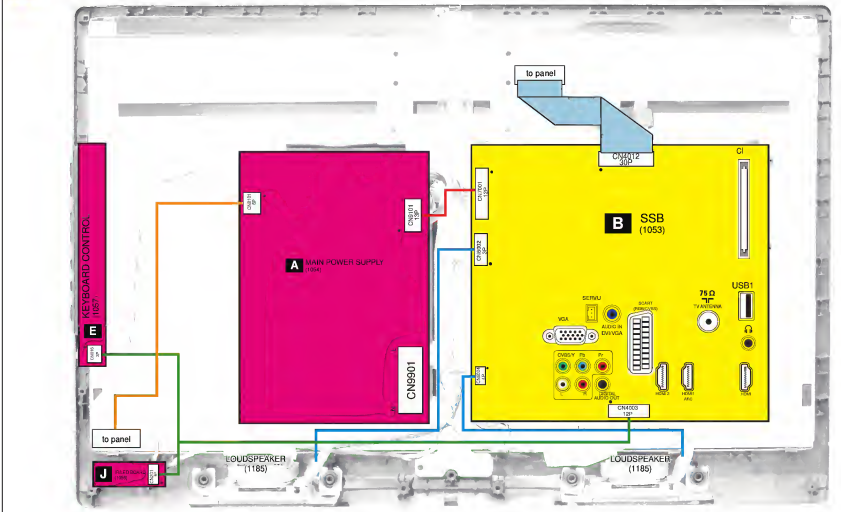
9.2 Wiring diagram 22" 3007 series

WIRING DIAGRAM 22" (3007 series)

Board Level Repair

Component Level Repair
Only for authorized workshops

See note in chapter 6 about cable position numbers.



19380_400_120051.eps
101025

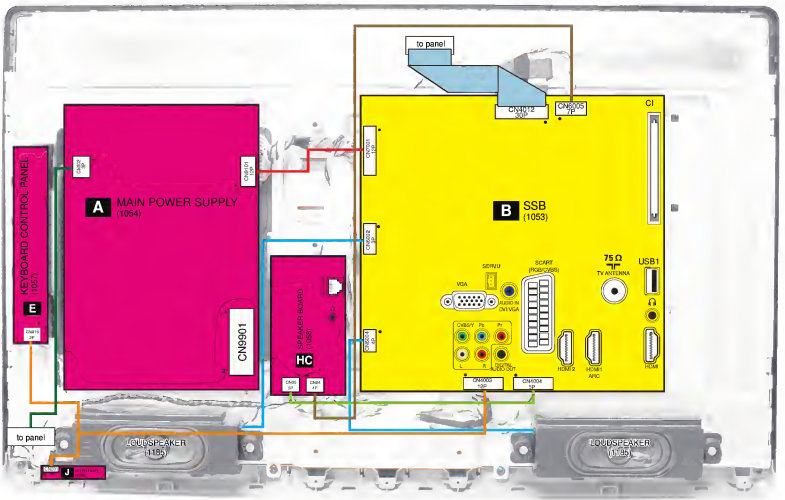
9.3 **Wiring diagram 22" 3017 series**

WIRING DIAGRAM 22" (3017 series)

Board Level Repair

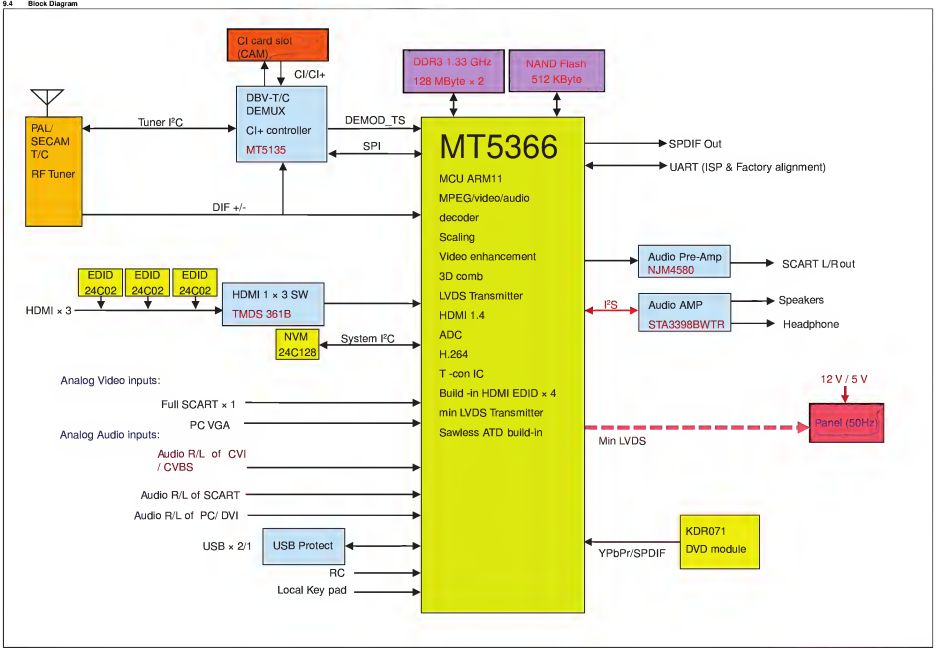
Component Level Repair
Only for authorized workshops

See note in chapter 6 about cable position numbers.



19380_401_120625.eps
120625

9.4 Block Diagram

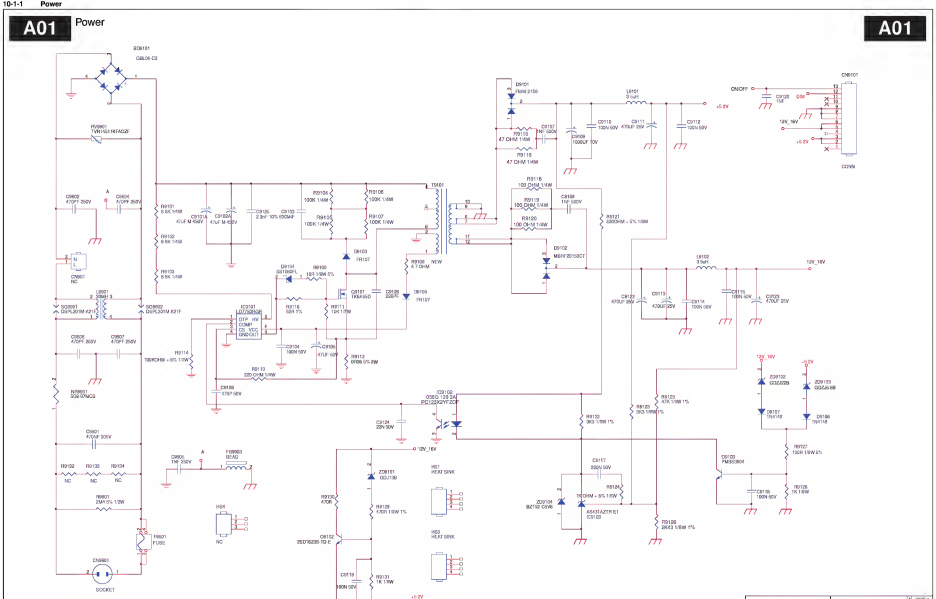


19380_402_120612.eps
120525

10. Circuit Diagrams and PWB Layouts

10.1 A 715G5309 PSU

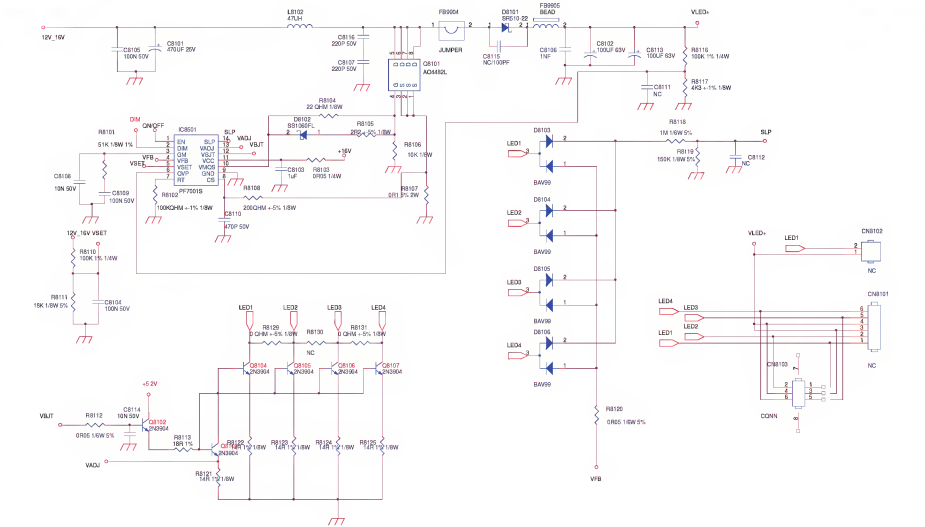
10-1-1 Power



10-1-2 A02 LED Driver

A02 LED Driver

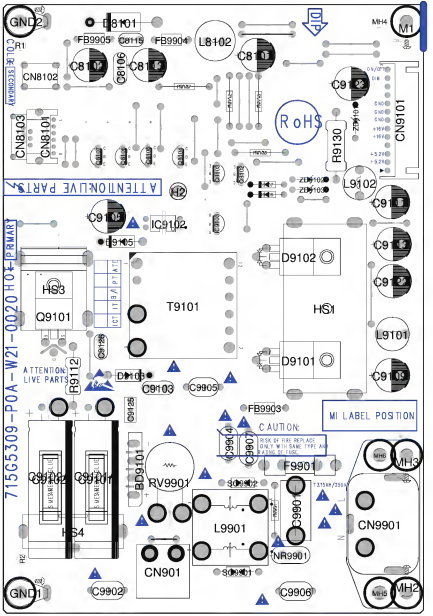
A02



LED Driver	715G5309	

19270_501_120409.eps
120409

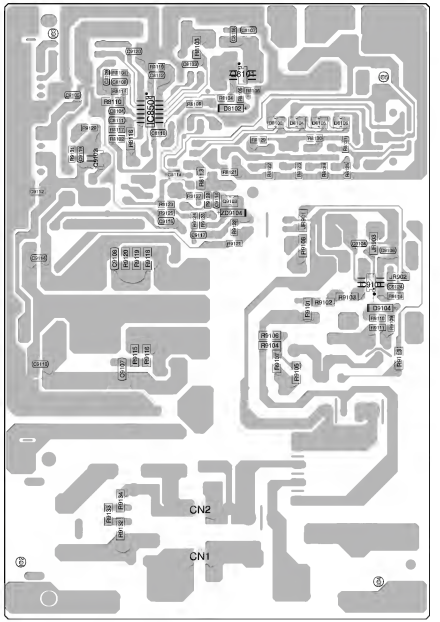
10-1-3 **Power layout top**



Power Layout top	715G5309	

19270_002_120409.eps
120410

10-1-4 **Power layout bottom**



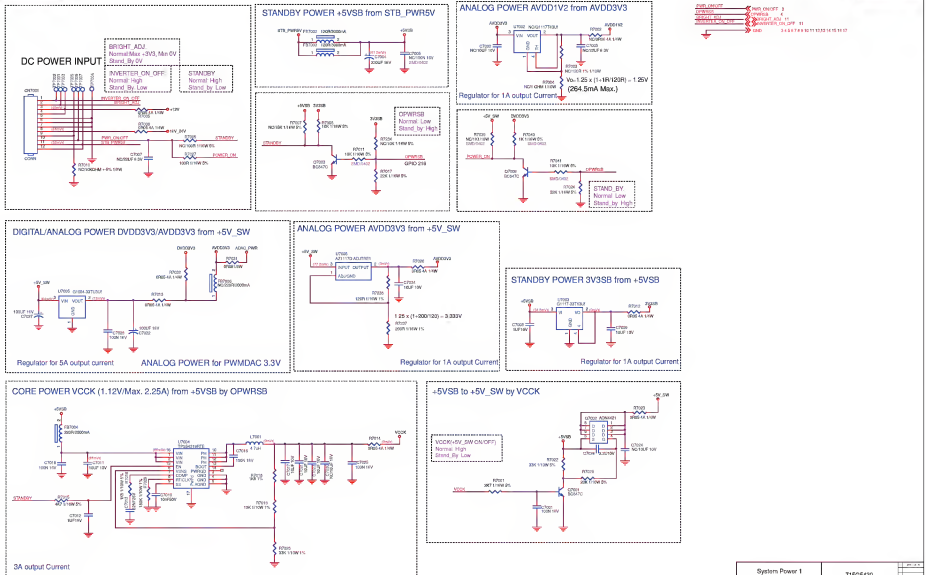
Power Layout Bottom	715G5339	1

19270_505_120409.eps
120410

10.2 B 715G5430 SSB S35 series

10-2-1 System Power 1

B01 System Power 1 **B01**

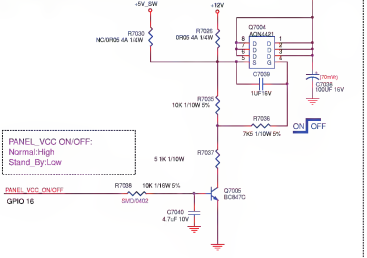


System Power 1	715G5430

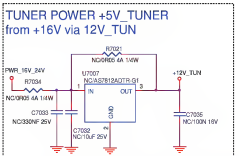
B02 System Power 2

B02

PANEL POWER PANEL_VCC form +12V

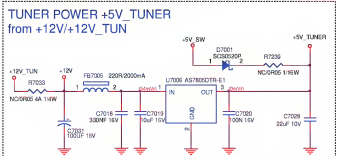


TUNER POWER +5V_TUNER from +16V via 12V_TUN



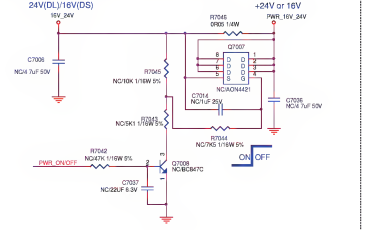
Regulator for 1A output Current

TUNER POWER +5V_TUNER from +12V/+12V_TUN



Regulator for 1A output Current

PWR to 24V or 16V for AUDIO



PANEL_VCC_ON/OFF → PANEL_VCC_ON/OFF 13

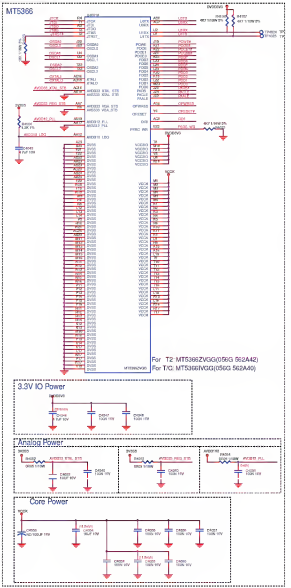
GND → GND 2,4,5,6,7,8,9,10,11,12,13,14,15,16,17

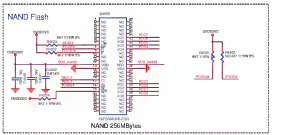
PWR_ON/OFF → PWR_ON/OFF 2

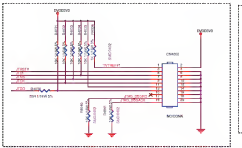
10-2-3 Peripheral

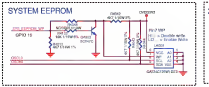
B03 Peripheral

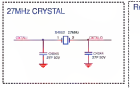
B03

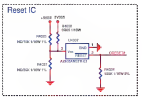


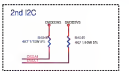


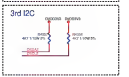










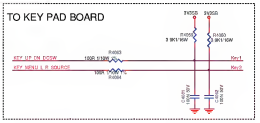


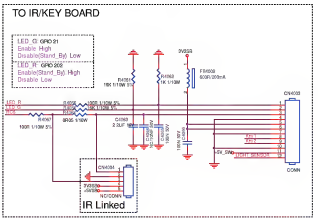
Peripheral	71503430	01

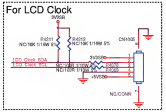
19270_506_130409.eps
130415

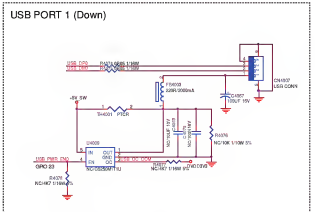
B04 Connector & USB & RS232

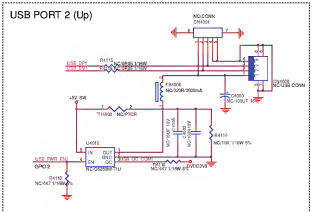
B04

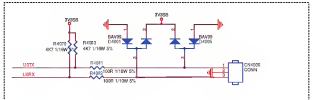


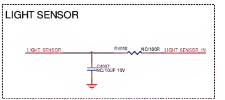








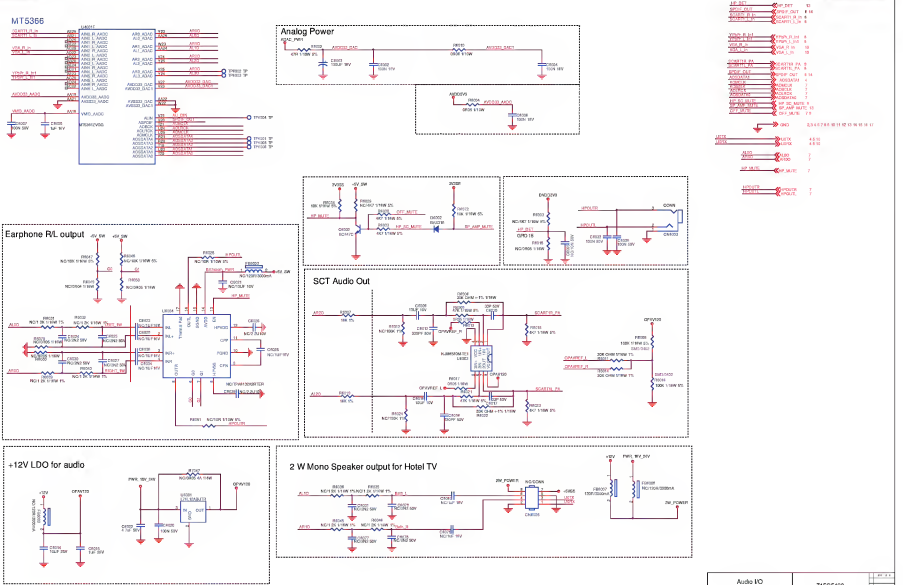




Connector & USB & RS232	71505430	

B05 Audio I/O & Headphone

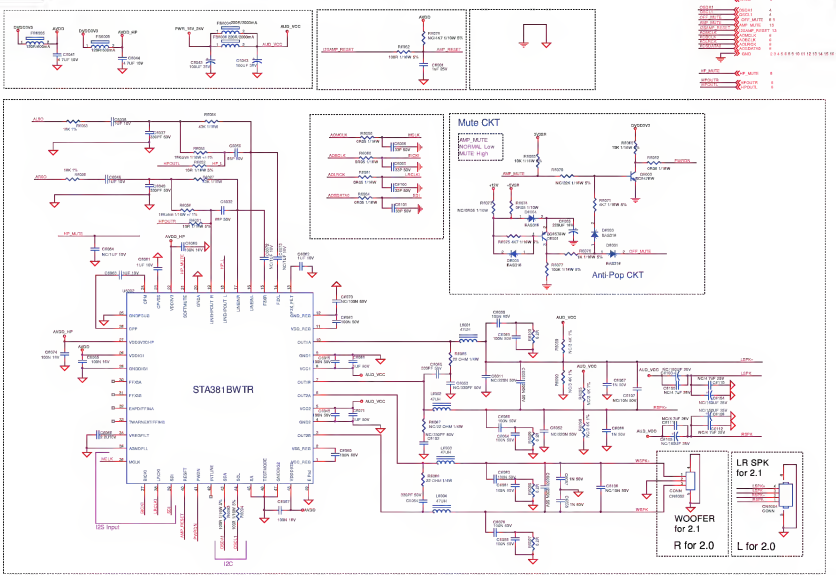
B05



Audio I/O & Headphone	71505430

B06 Speaker

B06



Speaker 71503430

19270_505_120409.eps 120410

10-2-7 Video I/O & SPDIF

B07 Video I/O & SPDIF

B07

MT5366

Analog Power

YPbPr & Audio IN

CVBS in share with Y

DVI/I Only

YPBPR IN

SPDIF OUT

AUDIO IN for YPbPr

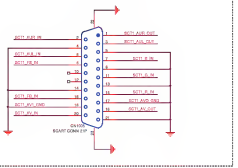
Video I/O & SPDIF	71505430	

19270_510_130409.eps
130410

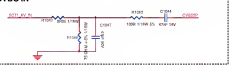
B08 Scart

B08

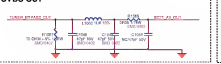
SCART (Full SCART) -- CVBS+SV+RGB+TV OUT



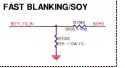
CVBS IN



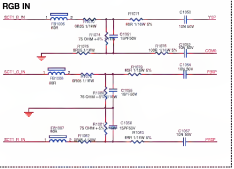
CVBS OUT



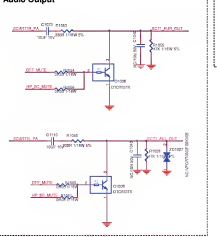
FAST BLANKING/SOY



RGB IN

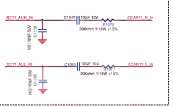


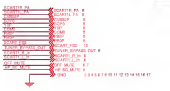
Audio Output



Function Select

Audio Input





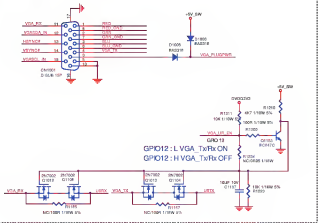
Scart 71505430

10-2-9 VGA Input

B09 VGA Input

B09

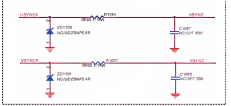
VGA Input



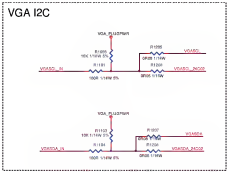
VGA Audio Input

VGA AUDIO

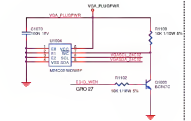
VGA SYNC SLICER



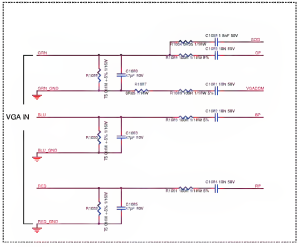
VGA I2C



VGA EDID



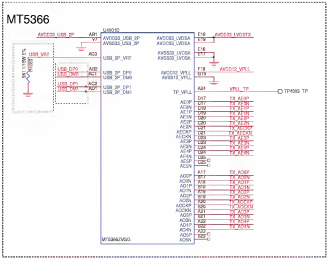
VGA IN



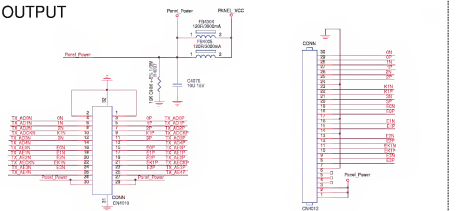
B10 LVDS

B10

MT5366

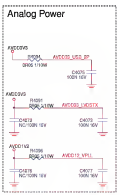


LVDS OUTPUT

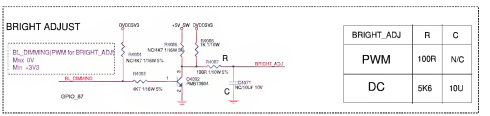


FOR WXGA PANEL FOR FULL HD PANEL FOR 22"/24" PANEL

Analog Power

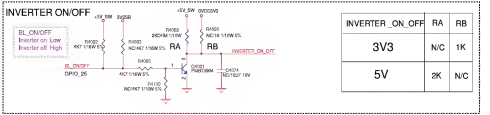


BRIGHT ADJUST



BRIGHT_ADJ	R	C
PWM	100R	N/C
DC	5K6	10U

INVERTER ON/OFF



INVERTER _ON_OFF	RA	RB
3V3	N/C	1K
5V	2K	N/C

LVDS	71505430

B11 DDR3 Interface

B11

MT5366

Analog Power

CAPs for DRAM IO Power

DDR3#1

DDR3#2

CAPs for DRAM IO Power

CAPs for DRAM IO Power

Damping and Terminnation for CLK

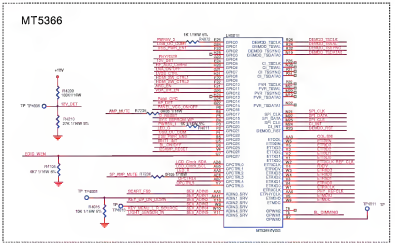
Damping for DDR3#1 ADDR/CMD

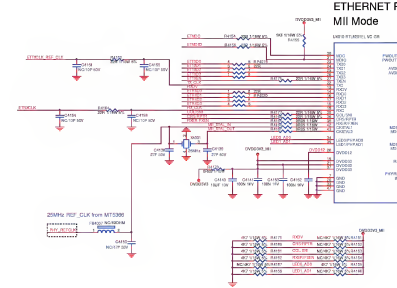
Damping for DDR3#2 ADDR/CMD

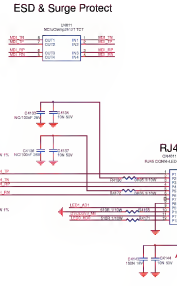
DDR3_DDRV= 1.5V

B12 GPIO & RJ45

B12







GPIO & RJ45 71505430

19270_515_120409.eps 120410

B13 HDMI Switch & Connector

B13

HDMI SWITCH

	HDMI SEL	HDMI PWR	HOTPLUG
close for CON1	H	L	H
close for CON2	H	H	L

MT5366

Analog Power

For one HDMI input (HDMI1/ Support ARC)

HDMI 1/Support ARC

Audio Return Channel (ARC)

	ARC_EN
ARC enable	L
ARC disable	H

HDMI 2

SIDE HDMI

CLK pull down resistance

SIDE HDMI ESD PROTECTER

HDMI 2 ESD PROTECTER

HDMI 1 ESD PROTECTER

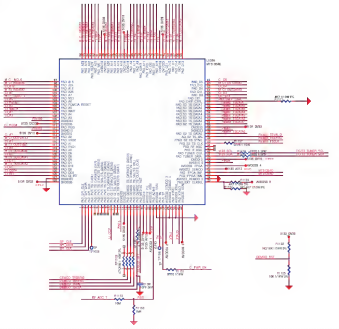
HDMI Switch & Connector	71505430	

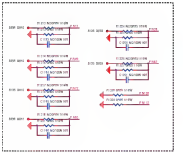
19270_516_130409.eps
130410

B14 DVB T/C Demodulator MT5135

B14

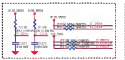
DEMODULATOR MT5135/MT5136 Co-layout

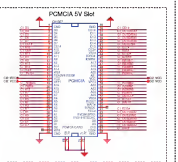


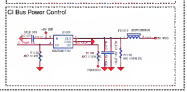


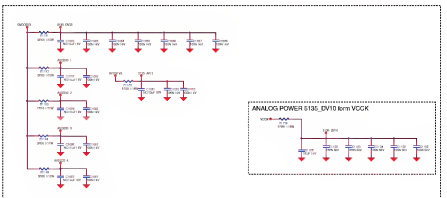
DEMODULATOR 27MHz Crystal

CI Interface









ANALOG POWER 5135_DV10 form VCCK

DVB T/C Demodulator MT5135	71505430	01.2.1

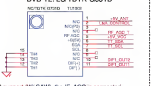
B15 Tuner

B15

Tuner

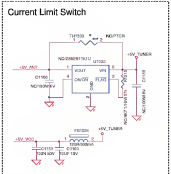
DVB-T/C: Panasonic ENV57U606F(094GPASEALL17M)
DVB-T2: Panasonic ENV57U04D6F(094GPASEALL15M)

DVB-T/C: LG TDTK-G731D
DVB-T2: LG TDTK-G631D

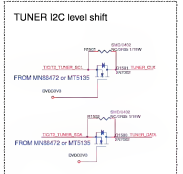


For LG T2 support (W/ SAW), the IF_AGC is connected.

Current Limit Switch

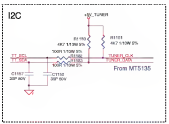


TUNER I2C level shift

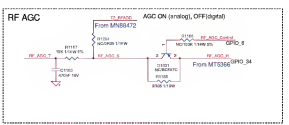


GND

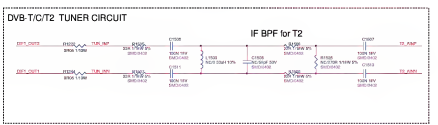
I2C



RF AGC



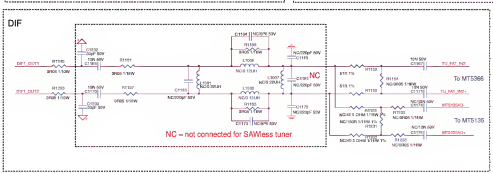
DVB T/C/T2 TUNER CIRCUIT



IF BPF for T2

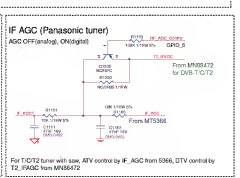
LNA(LG tuner)

DIF



NC – not connected for SAWless tuner

IF AGC (Panasonic tuner)



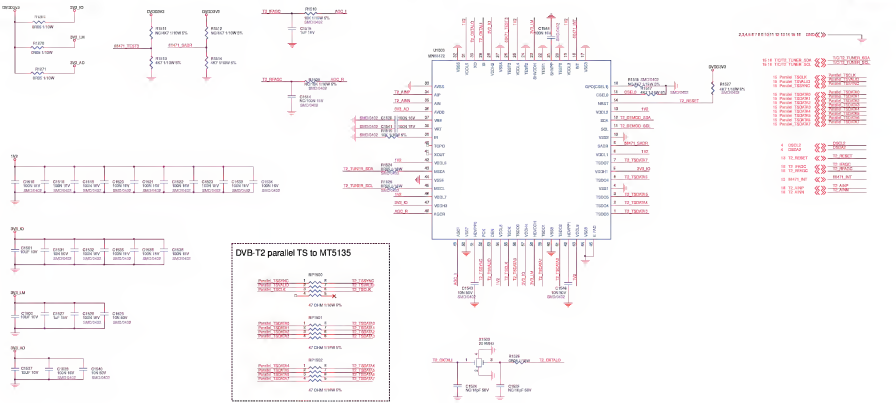
For T-/DT2 tuner with saw, ATV control by IF_AGC from 5366, DTV control by T2_IFAGC from MN88472

Tuner	71505430

10-2-16 DVB T2 Demodulator MN88472

B16 DVB T2 Demodulator MN88472

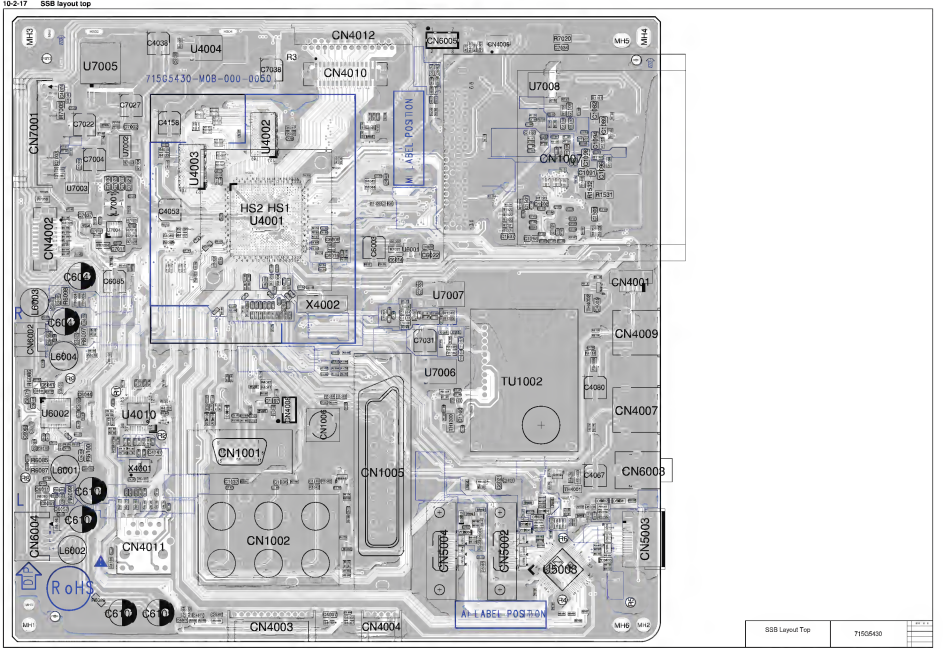
B16



DVB T2 Demodulate MN88472 | 71505430

19270_519_130409.eps 130410

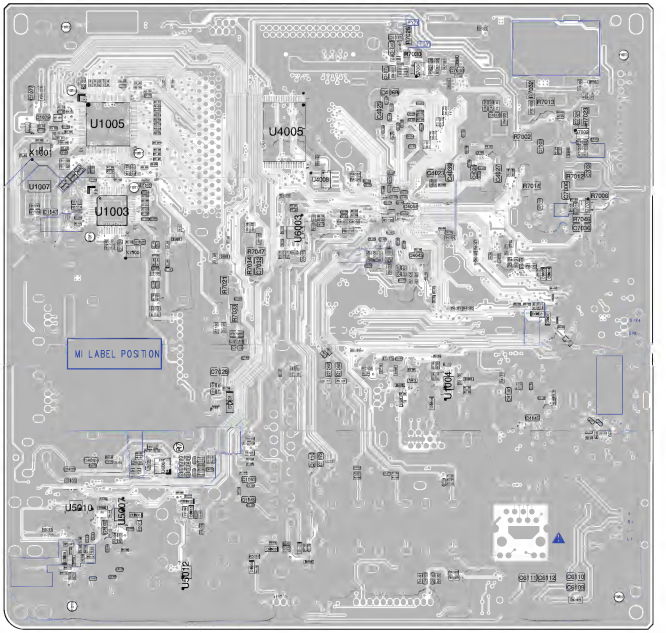
10-2-17 **SSB layout top**



SSB Layout Top	71505430

19270_500_130409.eps
130410

10-2-18 SSB layout bottom



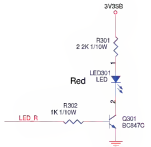
SSB Layout bottom	71505430	

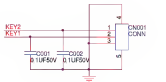
19270_521_130409.eps
130410

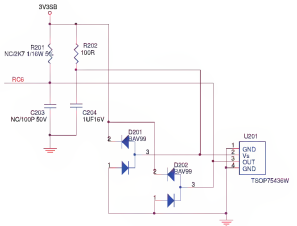
10.3 J 715G5230 IR/LED 3000 series

10-3-1 IR/LED board

J IR/LED board J



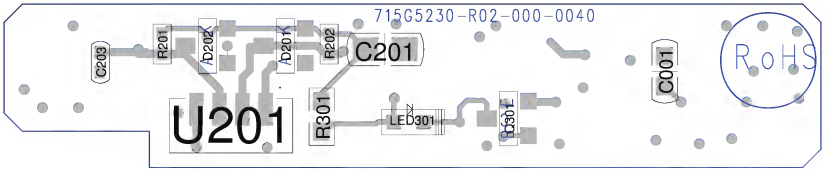




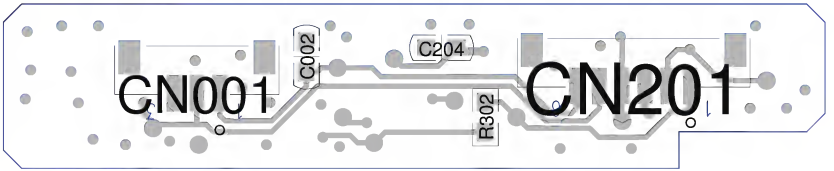
IR/LED board	715G5230	

19230_526_120906.eps
120906

Layout IR/LED Board (Top Side)



Layout IR/LED Board (Bottom Side)



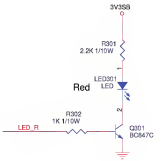
IR/LED board layout top/bottom	715G5230	

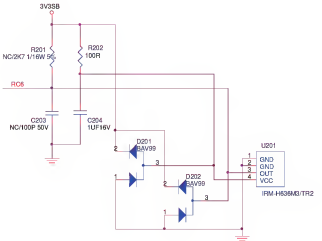
19230_527_120306.eps
120305

10.4 J 715G5596 IR/LED panel

10-4-1 IR/LED panel

J IR/LED panel J



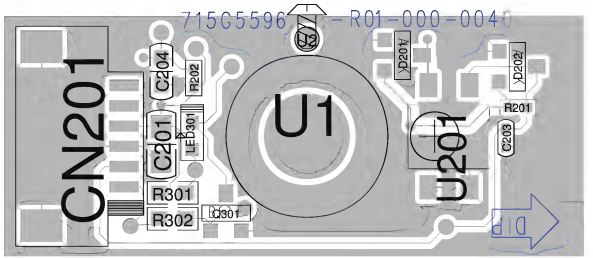


IR/LED panel	715G5596

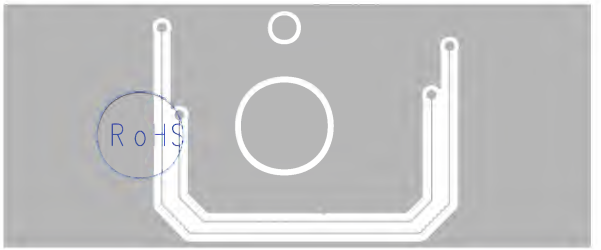
15242_504_120615.eps
120626

10-4-2 IR/LED board layout

Layout IR/LED panel (top side)



Layout IR/LED panel (bottom side)



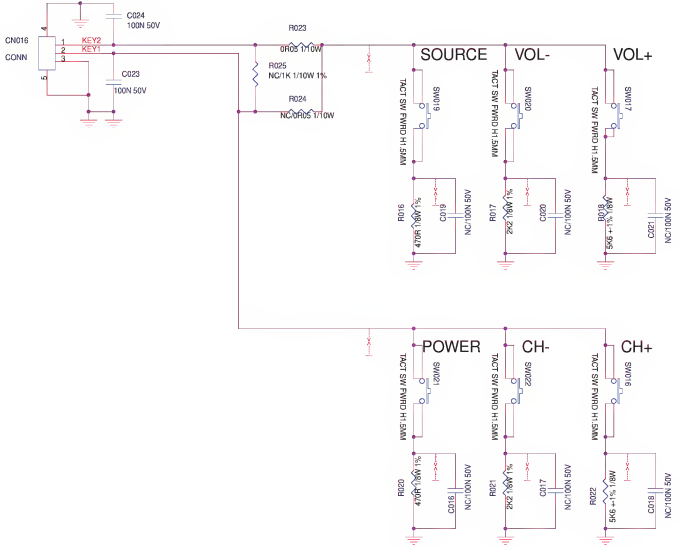
IR/LED board layout top/bottom	71505596	01

19042_506_120618.eps
120626

10.5 E 715G5252 Keyboard control panel 3500/4000 series

10-5-1 Keyboard

E Keyboard control panel E

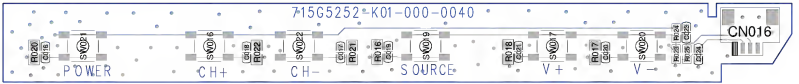


Keyboard control panel	715G5252

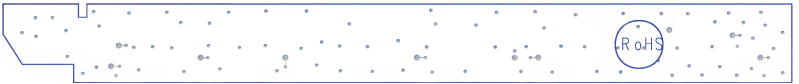
19240_513_130215.eps
130620

10-5-2 Key board layout

Layout Keyboard control panel (top side)



Layout Keyboard control panel (bottom side)

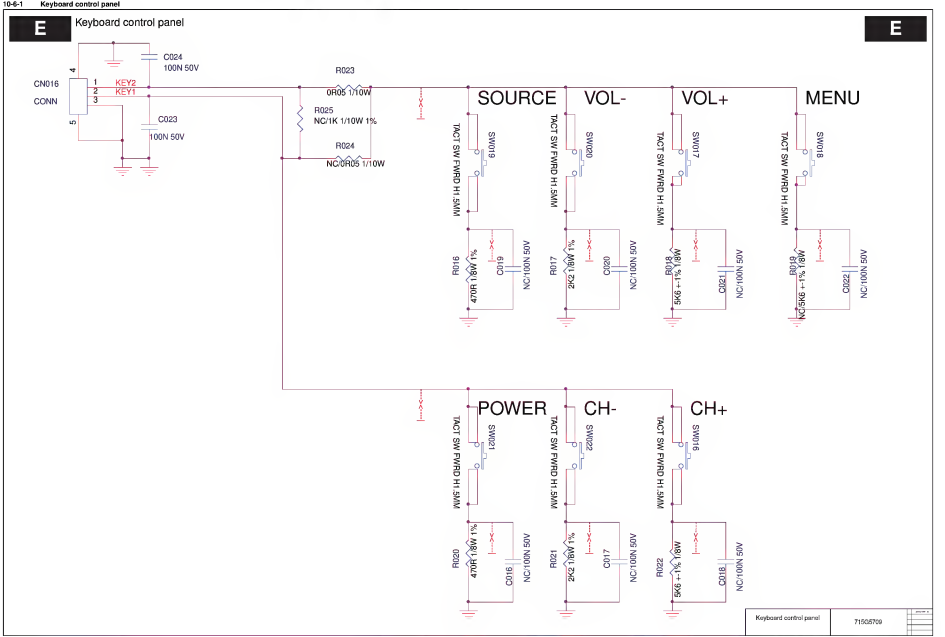


Keyboard control panel layout top/bottom	7150S252	

19040_514_120215.eps
120525

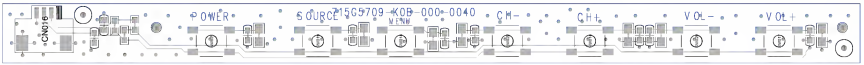
10.6 E 715G5709 Keyboard control panel 22" series

10-6-1 Keyboard control panel



10-6-2 Key board layout

Layout Keyboard control panel (top side)



Layout Keyboard control panel (bottom side)

Keyboard control panel layout top/bottom	71505709	

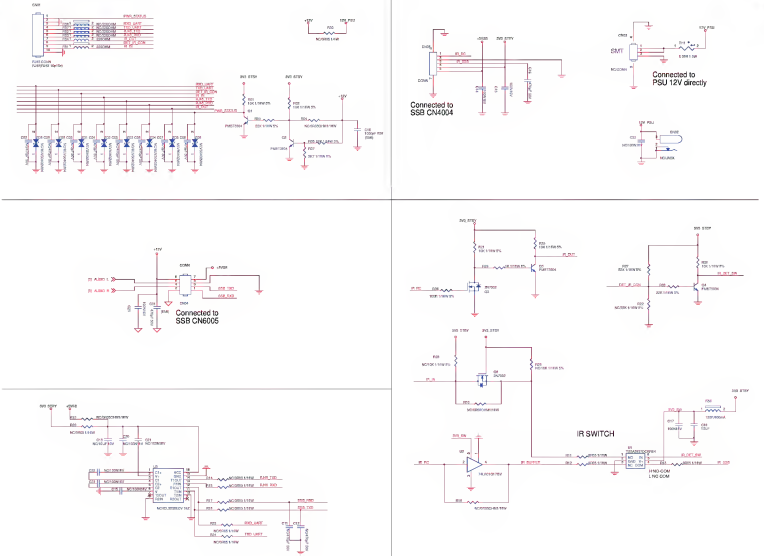
19343_514_120602.eps
120517

10.7 HC 715G5482 Hotel panel

10-7-1 RS232 Connector

HC01 RS232 connector

HC01



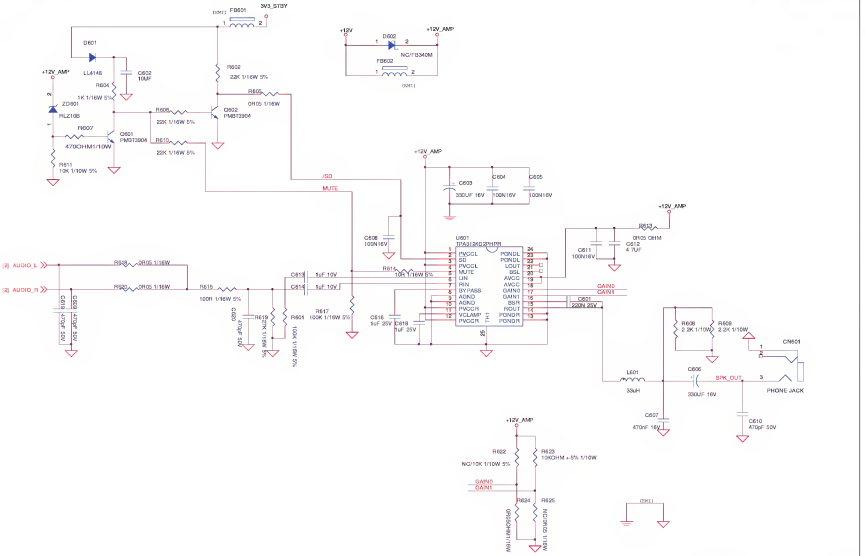
RS232 connector	715G5482	

15360_500_120622.eps 120606

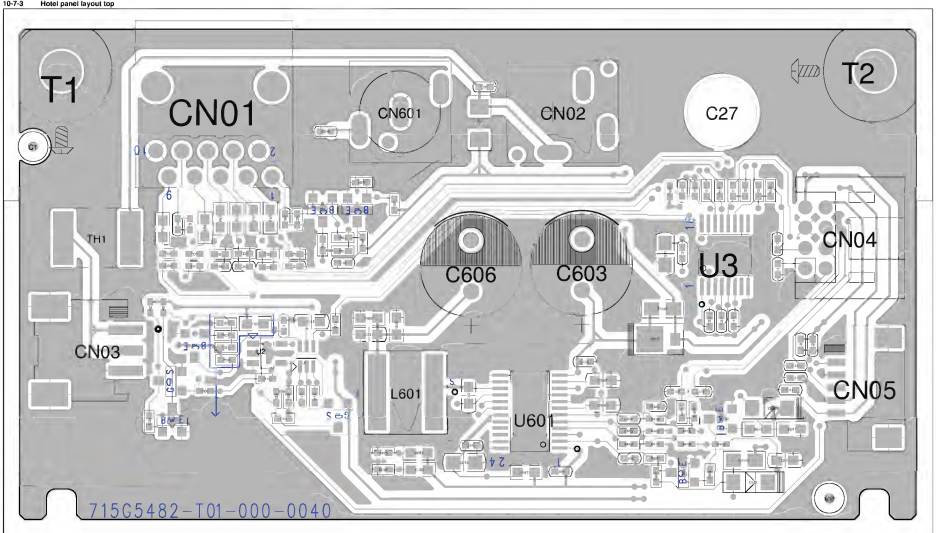
10-7-2 Audio amplifier

HC02 Audio amplifier

HC02



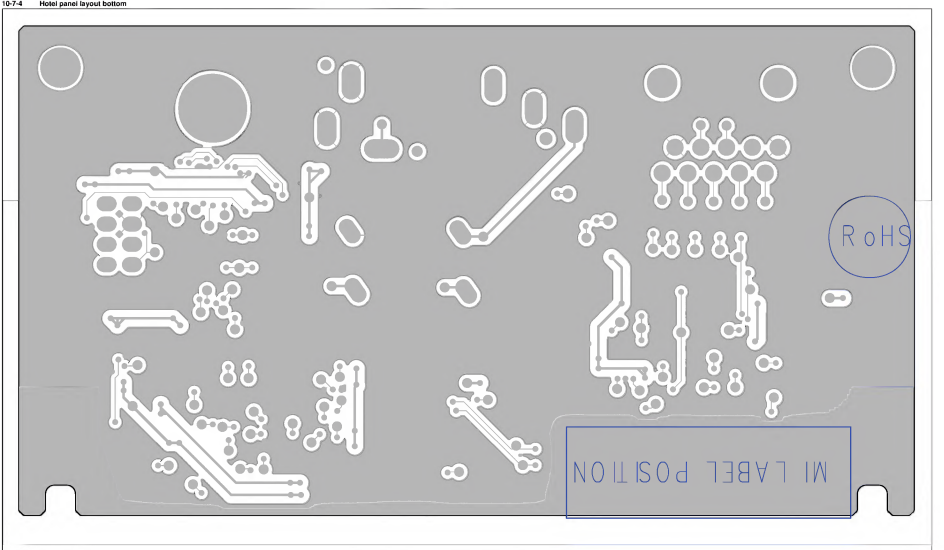
10-7-3 Hotel panel layout top



Hotel panel Layout top	715G5482	

19360_502_120822.eps
120906

10-7-4 **Hotel panel layout bottom**



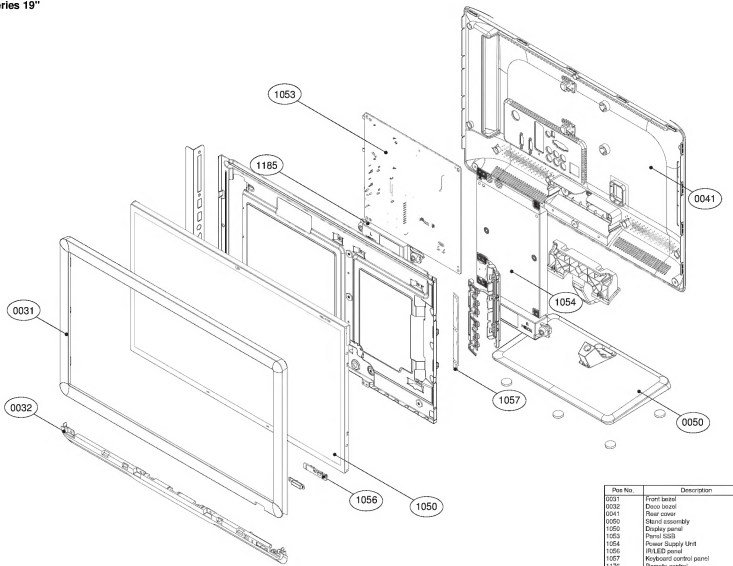
Hotel panel Layout bottom	71505482	

19360_505_120822.eps
120906

11. Styling Sheets

11.1 S35 series 19"

S35 series 19"

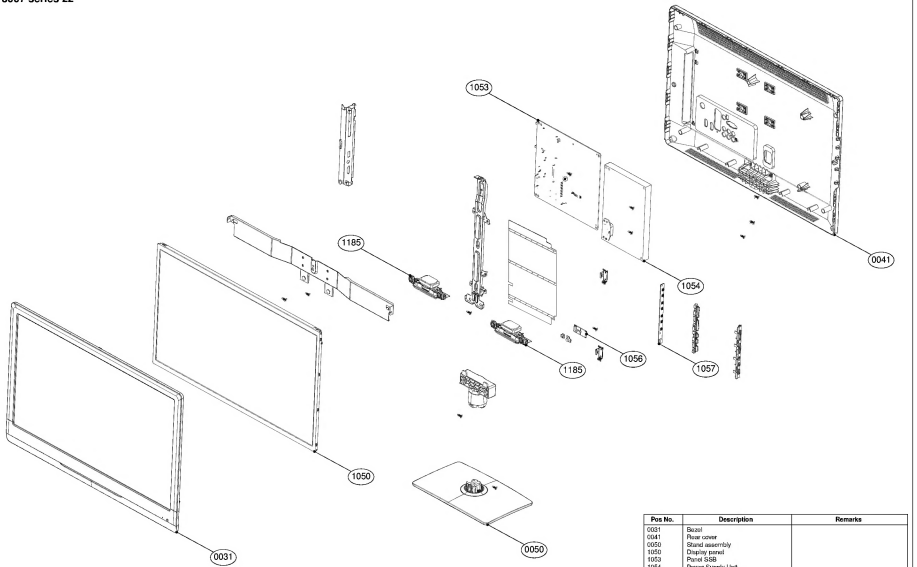


Pos No.	Description	Remarks
0031	Front bezel	
0032	Deco bezel	
0041	Rear cover	
0050	Stand assembly	
1050	Display panel	
1053	Panel SSB	
1054	Power Supply Unit	
1056	IR/LED panel	
1057	Keyboard control panel	
1176	Remote control	Not displayed
1185	Speakers	

FOR ELECTRICAL PARTS/ASSEMBLIES SEE WIRING DIAGRAM CHAPTER 9

19270_000_120401.eps
120419

3007 series 22"

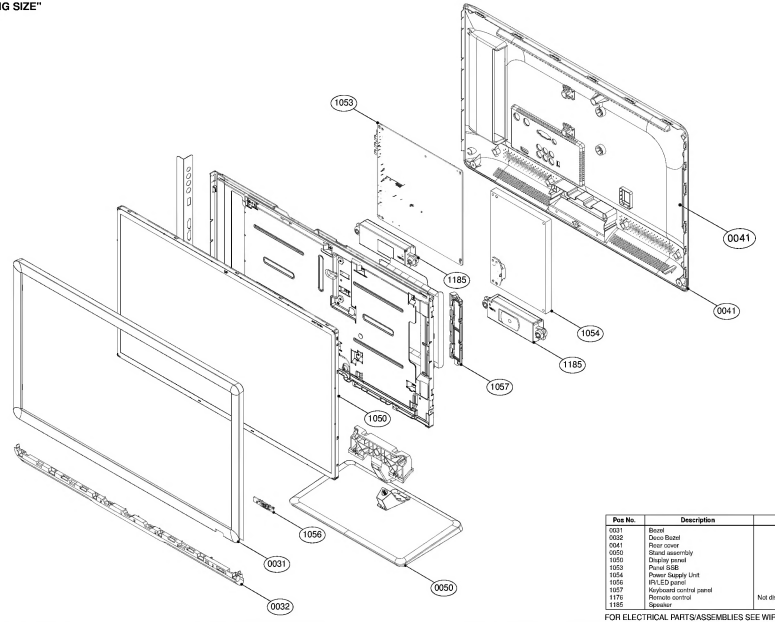


Pos No.	Description	Remarks
0031	Bezel	
0041	Rear cover	
0050	Stand assembly	
1050	Display panel	
1053	Panel SSB	
1054	Power Supply Unit	
1056	IR/LED panel	
1057	Keyboard control panel	
1175	Remote control	Not displayed
1185	Speaker	

FOR ELECTRICAL PARTS/ASSEMBLIES SEE WIRING DIAGRAM CHAPTER 9

19380_800_120829.eps
120925

STYLING SIZE"



Pos No.	Description	Remarks
0031	Bezel	
0032	Deco Bezel	
0041	Rear cover	
0050	Stand assembly	
1050	Display panel	
1053	Panel SSB	
1054	Power Supply Unit	
1056	IR/LED panel	
1057	Keyboard control panel	
1175	Remote control	Not displayed
1185	Speaker	

FOR ELECTRICAL PARTS/ASSEMBLIES SEE WIRING DIAGRAM CHAPTER 9

19380_801_120829.eps
120926